KENYA COLONY AND PROTECTORATE

Department of Agriculture Annual Report 1937

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Annual Report of the Department of Agriculture, 1937

VOLUME I

PART I—AGRICULTURE IN KENYA IN 1937

Weather

(For the following notes on the weather the Department is indebted to the Director of the British East African Meteorological Services.)

In the Trans Nzoia rainfall was above normal in every month of the year except September, October and December. The greatest plus abnormality occurred in January with 112 per cent above normal. The defects were most considerable in September (- 59 per cent) and December (- 52 per cent). The winter rains of July and August were 18 per cent above normal.

In the Kavirondo District the distribution in respect to the normal was very irregular. Only five months, January, April to June, and October were above normal; March and November were much below, - 90 per cent and - 77 per cent respectively.

West of the Rift, the monthly falls were also very irregular. The greatest departure from the average occurred in November (+121 per cent). Although eight months—January, March to August, and November—were above normal, with the exception of November the departures were generally small. The rainfall in February was 51 per cent below normal.

Rainfall east of the Rift was also irregular. The abnormalities both in excess and defect were large. The long rains of March to June showed consistently plus abnormalities, the greatest being +116 per cent in June. During the short rains, October was above the average by 64 per cent, November being normal, and December 13 per cent below normal.

In the Rift also the long rains of March, April and May were favourable, being about 40 per cent above the average. This was followed by a shortage in June, and good winter rains in July and August. The rainfall during the end of the year was notably in defect.

On the Coast, the March and April rains were good. The short rains set in heavily in October, and remained above the average for November and December. January and February, and June to September were markedly below the average.

In the main coffee area rainfall was consistently good. Defects from the average occurred in January, May, July and October, but were of short duration and occurred between periods of marked excess. Rainfall in February was 72 per cent above the average, the excess continuing until the end of April. Good rains fell again in June and August to September, the abnormalities being +214 per cent, +270 per cent and +158 per cent respectively.

The rainfall for the year throughout the Colony was distinctly favourable, and on the whole, seasonable. The so-called long rains of March to May, the short rains of October to December, and the Trans Nzoia winter rains of July and August were all above the average, the defects in other months being generally of short duration and occurring between spells of good rainfall.

A table of percentage departures from the average is shown below for each of the main agricultural areas:—

PERCENTAGE DEPARTURES FROM AVERAGE IN THE MAIN AGRICULTURAL DISTRICTS

1937

Agricultural Districts	Trans Nzoia	Kavirondo	West Rift	East Rift	Rift	Main Coffee Areas	Coast
No. of Stations	20	17	15	13	25	20	18
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
January	+112	+57	+7	—45	—5	—55	—89
February ..	+17	—6	—51	—77	—57	+72	—88
March	+31	—90	+25	+66	+25	+2	+70
April	+36	+51	+65	+34	+59	+31	+48
May	+20	+24	+13	+11	+42	—78	0
June	+8	+4	+23	+116	—78	+214	—45
July	+18	—9	+6	—5	+44	—85	—55
August	+18	—1	+10	+22	+20	+270	—12
September ..	—59	—47	—74	—63	—63	+158	—40
October	—4	+14	—8	+64	+7	—79	+283
November ..	+223	—77	+121	0	—84	+49	+30
December ..	—52	—18	—21	—13	—26	+31	+17
YEAR ..	+19	+14	+12	+15	+28	+35	+10

General

The year opened with the prospects favourable. The overseas markets were buoyant. Good crops had just been harvested and no particular adverse circumstances were in evidence. From the middle of the year, however, the economic scene underwent a drastic change. The downward turn of the general level of wholesale prices was reinforced by particular circumstances affecting important Kenya products. First came the publication of a greatly increased estimate of the American cotton crop. Soon afterwards the prices of sisal, hides, oilseeds, and some other commodities showed an appreciable downward movement. Finally, near the end of the year came a virtual collapse of the coffee market following events in Brazil. A notable exception is pyrethrum, which has risen to a very profitable figure. Tea and maize have remained fairly steady.

In accordance with the recommendations made in Sir Alan Pim's report, the Agricultural and Veterinary Services were separated. The new Agricultural and Veterinary Departments came into being on the 1st June.

Sir Frank Stockdale paid a further visit to East Africa from January to March, his previous visit having been made some six years earlier. The objects of his visit were to examine the progress and development in experimental work, to examine various marketing schemes, to discuss some matters relating to animal husbandry and to study in some detail the serious problem of soil erosion. The Department and agriculturists are indebted to Sir Frank Stockdale not only for the extremely useful account of his visit, which was published by the Colonial Office, but also for the encouragement he gave by his personal contact with agricultural workers in this territory.

In February an Agricultural Officer was seconded for the special duty of conducting soil erosion and land utilization surveys of the native reserves. During the year he completed surveys of the Machakos, Kamasia, Kitui and Embu reserves.

A further and more detailed survey was made of the Machakos Reserve in October and November by an officer specially appointed for the purpose. A free grant of £10,000 was obtained from the Colonial Development Fund for soil

conservation work at Matungulu in the Machakos Reserve and a loan of £24,000 to be refunded to Government by the Local Native Council for work in other parts of the Reserve.

Assistance was also received from the Colonial Development Fund to the extent of £42,000 for the development of water supplies in native areas and £11,400 for work, including the provision of water supplies, in connexion with stock routes for the movement of cattle from over-stocked reserves.

A noticeable feature of the last few years has been the extent to which improvements in overseas prices have been counteracted by increases in ocean freight rates. Since the trough of the depression, the rate on maize rose from Sh. 17/6 to Sh. 37 per ton; on sisal from Sh. 35 to Sh. 45; on coffee from Sh. 65 to Sh. 72/6; on cotton (Europe) from Sh. 30 to Sh. 40; on cotton seed from Sh. 22/6 to Sh. 30/9, and on tea from Sh. 45 to Sh. 55. During the rise of prices some increase was to be expected, but after the heavy declines of the latter part of the year some reconsideration became necessary. The rate on sisal fibre has been subsequently reduced to Sh. 37/6 and that on maize to Sh. 27/6.

Agricultural Credit

Of the £150,000 capital mentioned in last year's report as having been earmarked for Land Bank purposes, £100,000 was drawn during the year (not including the £100,000 intended to finance the Farmers' Conciliation Board). New long term loans numbering 91 and totalling £123,190 were made; also 36 short-term advances aggregating £9,198. During the year 20 mortgage loans to a total of £21,750 were repaid completely.

The loans issued in 1937 were, as to 54.2 per cent, for discharge of existing mortgages, as to 22.5 per cent for purchase of land, as to 12.2 per cent for permanent improvements and as to 11.1 per cent for purchase of stock and implements and the conduct of farming operations.

Payments of instalments by mortgagors were disappointing, and this factor reduces the prospect of securing any reduction in the interest rate. The fluctuations of farming fortune, particularly heavy in a new country at a time of unstable prices, make it appear probable that the Land Bank will find it necessary to extend leniency in a considerable number of cases.

Five properties reverted to the Land Bank during the year, making a total of 15, representing a total of £24,697 in the books. On this sum interest has to be paid by the Bank, and in cases where coffee plantations exist it is necessary to maintain the capital asset.

The Central Agricultural Advances Board was continued in operation in an effort to wind it up. Such payments as participants were able to make, however, were largely swallowed up by interest charges. It was suggested to Government that interest charges on outstandings should be discontinued.

The Farmers' Conciliation Board dealt with 33 applications during the year, of which 9 were approved, 19 rejected, 4 withdrawn and one remained under consideration. The total of advances authorized was £8,944, the number of applicants concerned being 9.

For more detailed information reference may be made to the Report of the Board of the Land and Agricultural Bank of Kenya.

Marketing

The marketing of native produce was brought further under control during the year. Inspection services were extended and under the Native Produce Marketing (Weights and Measures) Rules, 1937 (Government Notice No. 690), units of weight or measure for use in the purchase of produce were laid down. These included volumetric measures for quantities up to one bag (2— or 224 lb.), applicable to cereals and oilseeds.

Agricultural Statistics

The Agricultural Census is now taken biennially, and the next one will be taken in February, 1938. The results will be published in due course as a separate Agricultural Census Report.

Bi-monthly crop forecasts have been issued as usual. Current agricultural conditions are now reported monthly in the Trade and Information Bulletin compiled under the auspices of the Standing Board of Economic Development, and separate Crop Reports are not now issued except to the local Press.

Agricultural Exports in 1937

The value of agricultural produce exported from the Colony during 1937 amounted to £3,200,629, as compared with £3,278,662, a decrease of £78,033.

The chief increases were :—

	£
Tea	131,182
Hides	72,591
Cotton	41,729
Skins	37,144
Pyrethrum	11,910
Wattle Extract	11,458
Wool	8,459
Maize Meal	8,470

The chief decreases were :—

	£
Coffee	237,120
Cattle, Living	46,664
Maize	34,539
Sugar	24,960
Sisal	16,740
Sesame Seed	13,251

The changes in quantity in the case of the more important products are given below:—

	Increase	Decrease
Cattle, Living (Number)	—	5,819
Hides (Cwt.)	3,879	—
Skins (Number)	12,505	—
Wool (Centals)	872	—
Coffee (Cwt.)	—	135,375
Cotton (Centals)	13,037	—
Sisal (Tons)	—	3,471
Maize (Cwt.)	—	724,007
Maize Meal (Cwt.)	—	38,338
Wheat Flour (Cwt.)	7,523	—
Sesame Seed (Tons)	—	1,288
Pyrethrum (Cwt.)	—	1,385
Sugar (Cwt.)	—	39,083
Tea (Cwt.)	14,736	—
Wattle Extract (Cwt.)	13,360	—

QUANTITIES OF AGRICULTURAL COMMODITIES THE PRODUCE OF KENYA EXPORTED DURING THE YEARS 1933 TO 1937 INCLUSIVE

Commodities	Unit of Quantity	1933	1934	1935	1936	1937
Animals, Living						
Cattle	No.	331	344	3,486	7,393	1,574
Sheep and Goats	,,	3,735	4,094	5,491	8,897	11,133
Animal Products						
Bacon and Ham	Cwt.	691	757	989	1,168	1,132
Beeswax	,,	954	1,807	1,184	808	1,323
Butter	,,	7,514	11,330	16,287	24,983	22,898
Cheese	,,	473	602	756	794	865
Ghee	,,	2,309	2,927	4,532	3,965	2,296
Hides	,,	91,733	100,651	80,684	52,462	56,341
Meat, Fresh and Preserved	,,	3,927	1,773	1,842	2,332	3,324
Skins (Sheep and Goats)	No.	960,610	979,585	1,190,251	1,794,060	1,806,565
Wool	Cntl	9,330	10,022	12,626	13,026	13,898
Crop Produce						
Coco-nuts and Copra	ton	—	—	—	488	174
Coffee	Cwt.	257,214	187,017	359,883	409,262	273,887
Fibres—						
Cotton	Cntl	10,752	11,748	28,418	58,152	71,189
Sisal	ton	19,850	24,016	32,136	34,746	31,275
Fodder and Offals	,,	1,238	1,674	4,764	4,746	2,675
Grains, Pulses and Meals—						
Beans	Cwt.	13,495	17,383	30,464	33,693	19,327
Maize	,,	1,131,549	439,958	1,198,605	1,452,380	728,373
Maize Meal	,,	24,924	90,895	106,743	137,761	99,423
Pulse (other than Beans)	,,	5,314	3,239	3,025	6,318	8,388
Wheat	,,	118	2,004	1,025	45,996	7,809
Wheat Flour	,,	41,076	47,421	77,561	61,875	69,398
Miscellaneous	,,	13,068	14,797	24,056	16,748	4,317
Oil Seeds—						
Cotton	ton	103	291	1,202	1,066	890
Groundnut	,,	397	11	269	2,503	2,852
Linseed	,,	413	168	—	—	19
Sesame	,,	3,242	1,529	1,959	2,407	1,119
Sunflower	,,	—	—	—	316	314
Oils—						
Coco-nut	Gallon	44,756	16,915	3,724	18,446	26,199
Essential	,,	3,739	2,477	3,961	2,640	523
Groundnut	,,	—	12,801	5,853	1,977	7,128
Sesame	,,	39,845	18,068	94,486	81,756	105,451
Potatoes	Cwt.	51,192	40,445	96,675	103,347	71,995
Pyrethrum	,,	—	—	—	20,798	19,413
Sugar (Raw and Crystallized)	,,	82,644	73,364	86,055	131,904	92,821
Tea	,,	17,462	22,115	45,108	67,099	81,835
Wattle Bark	,,	216,081	258,177	223,138	240,914	201,655
Wattle Extract	,,	28,759	49,734	101,888	110,272	123,632

VALUES OF AGRICULTURAL COMMODITIES THE PRODUCE OF KENYA EXPORTED DURING THE YEARS 1933 TO 1937 INCLUSIVE

Commodities	1933	1934	1935	1936	1937
	£	£	£	£	£
Animals, Living for Food					
Cattle	537	579	18,231	50,898	4,234
Sheep and Goats	1,788	2,302	2,755	4,313	5,425
Miscellaneous	291	264	324	221	152
Animal Produce					
Bacon and Ham	4,638	5,022	6,369	7,247	7,646
Beeswax	3,935	7,046	4,933	4,044	7,188
Butter	27,268	41,266	59,652	96,564	93,916
Cheese	2,186	2,576	3,318	3,248	3,601
Ghee	7,118	7,951	11,638	11,367	9,820
Hides	132,103	168,550	143,538	123,480	196,071
Meat, Fresh and Preserved	9,516	5,983	7,472	9,112	11,437
Skins (Sheep and Goats)	20,496	26,089	35,849	67,137	104,281
Wool	38,481	30,037	41,710	44,174	52,633
Crop Produce					
Coco-nuts and Copra	1,165	25	638	5,802	2,718
Coffee	832,353	493,343	934,923	969,804	732,684
Fibres—					
Cotton	23,584	28,483	76,326	149,789	191,518
Sisal	249,868	311,371	423,112	690,459	673,719
Fodder and Offals	4,969	3,787	16,034	16,474	12,000
Grains, Pulses and Meals—					
Beans	4,441	6,672	9,368	11,346	8,284
Maize	212,699	104,754	184,965	233,371	198,832
Maize Meal	5,815	25,755	20,002	20,716	29,186
Pulse (other than Beans)	2,022	1,534	1,635	2,011	3,294
Wheat	50	591	479	22,883	4,746
Wheat Flour	25,158	30,603	49,730	40,540	45,264
Miscellaneous	3,144	3,633	5,657	4,227	1,609
Oil Seeds—					
Cotton	309	694	3,210	2,867	3,357
Groundnuts	3,215	90	3,217	32,857	28,912
Linseed	3,202	1,504	—	—	1,117
Sesame	36,761	16,162	20,917	27,856	14,605
Sunflower	—	—	2,080	2,526	2,507
Oils—					
Coco-nut	4,118	1,007	354	1,983	3,255
Essential	8,777	6,799	7,823	7,687	2,337
Groundnut	—	1,116	727	277	993
Sesame	4,099	1,735	15,201	12,086	16,196
Potatoes	10,704	9,170	21,372	21,861	16,504
Pyrethrum	—	—	—	47,905	59,815
Sugar (Raw and Crystallized)	66,963	57,781	52,976	76,301	51,341
Tea	76,667	112,062	217,047	335,690	466,872
Wattle Bark	46,614	51,658	44,570	48,747	45,484
Wattle Extract	20,150	28,711	58,992	64,298	75,756
Other Agricultural Produce	—	—	3,071	6,494	11,320
Total £	1,895,204	1,596,705	2,510,215	3,278,662	3,200,629

Crops

Coffee

Exports during the period July, 1936, to June, 1937, amounted to 348,672 cwt. According to the Coffee Board, stocks in Nairobi decreased by 25,000 cwt. during the period, so that the yield of the 1936–37 crop may be put at 323,672 cwt. The figure of exports compares with 409,949 cwt. for the 1935–36 season.

A spell of dry weather in the middle of 1937, followed by an attack of thrips, caused a setback to the coffee, particularly in eastern districts. Heavy rain fell subsequently; the trees recovered well and it was thought that, though early pickings would be small and light, the main crop would be a heavy one. When the crop was picked, however, it was found that the weight of bean had been affected, and early anticipations of yield had to be drastically reduced. In western districts an acute labour shortage developed and many planters were unable to pick the whole of their crop. Exports for the first ten months of the 1937–38 season have reached a total of 296,149 cwt. as compared with 324,838 cwt. during the corresponding period of the previous season.

Prices in London and elsewhere had shown a gratifying improvement during the 1936–37 season. Before the 1937–38 crop could be placed upon the market, however, a severe fall occurred as a consequence of events in Brazil, and perhaps also to some extent as one manifestation of a more general setback which has affected a large number of commodities. Among basic coffees, Rio No. 7 fell from Sh. 39 per cwt. f.o.b. in September to Sh. 17/6 in April; Santos No. 4 fell from Sh. 49 to Sh. 25/6 and Colombian Medellin (c.i.f.) from Sh. 52/6 to Sh. 45. The average prices received for Kenya coffee on the London market had been well above those realized a year earlier until October, 1937, but the October average fell to Sh. 6 per cwt. below the previous year; November to Sh. 9 below; December to Sh. 11 below; January to Sh. 19 below; February to Sh. 15 below; March to Sh. 10 below and April Sh. 12 below. On the Nairobi market prices from December onwards were from Sh. 7 to Sh. 9 below the previous year.

Monthly average prices realized at London auctions during the last five years have been as follows:—

Shillings per cwt.

Month	1933	1934	1935	1936	1937
January	73	60	80	64	79
February	67	74	84	66	77
March	62	79	73	65	66
April	57	70	66	55	65
May	56	65	54	49	62
June	59	52	38	48	59
July	57	57	36	45	61
August	55	52	37	53	56
September	57	64	38	60	62
October	55	40	47	67	61
November	62	54	52	67	58
December	58	57	47	67	56

(Figures for 1936 onward by courtesy of the Coffee Board of Kenya. Those for previous years are as received by the Department from London).

Monthly average prices realized at Nairobi coffee auctions during 1936 and 1937 were as follows:—

	1936	1937
	Sh. per Cwt.	*Sh. per Cwt.*
January	35	43
February	35	42
March	31	40
April	27	38
May	—	39
June	—	41
July	25	40
August	34	43
September	35	44
October	37	44
November	43	43
December	43	34

(Figures by courtesy of the Coffee Board of Kenya.)

During recent years, with the increased production of Kenya coffee and the comparative inelasticity of the demand from London it has been necessary to seek other markets. Increased quantities have been consigned to the United States of America and Canada, and efforts have been made to develop the South African market. The amounts consigned to the United Kingdom and to other destinations during the

last four crop years are shown below. The figures are as compiled by the Coffee Board of Kenya from information supplied by the Commissioner of Customs:—

Crop Year	United Kingdom		Other Destinations		Total	
	Cwt.	*Per cent*	*Cwt.*	*Per cent*	*Cwt.*	*Per cent*
1934–5 ..	121,789	51	117,501	49	239,290	100
1935–6 ..	105,577	26	304,372	74	409,949	100
1936–7 ..	138,712	40	209,960	60	348,672	100
1937–8 .. (10 months)	126,280	43	169,869	57	296,149	100

During the period of comparatively high coffee prices preceding 1930 coffee planting proceeded actively in many parts of Kenya. In some areas early promise of fair yields was not realized owing to unforeseen troubles such as Coffee Berry Disease. In come areas early yields were due to the first flush of virgin fertility and were not maintained when this was exhausted. Soil erosion played a not unimportant part; anti-erosion measures have become general only during recent years, and not before grave damage has been done. But apart from these physical factors there is the economic factor that many plantations which would have continued to be profitable ventures at the prices ruling before 1930 yield an inadequate financial return at the prices which have ruled during the last few years. Not only have London prices falllen heavily, but with increased production in Kenya more and more coffee has had to be consigned to markets which do not offer so high a premium for fine quality. Average prices received have therefore declined heavily and apparently permanently. The decline appears to have affected some districts to the extent that very little of the crop now enters the high-priced field.

In consequence, some districts may be described as sub-marginal under the market conditions which have prevailed not only since the recent change of policy in Brazil, but during the last four or five years. Such districts, having specialized in coffee growing, now present an acute problem. Considerable distress prevails, and an appreciable amount of capital invested by planters and by the Land Bank is in jeopardy. As a preliminary step economic surveys are being undertaken by this Department in co-operation with the Coffee Board of Kenya, and the position is being carefully studied.

The Railway Administration decided to extend to the industry a valuable measure of assistance by reducing by half the railage charge on coffee consigned to the coast for export. The reduction was brought into operation as from 1st January, 1938, pending the continuance of low price levels. The value of the reduction amounted to Sh. 18/71 per ton at Thika, Sh. 25/88 at Koru and Sh. 28/79 at Kitale.

Maize

The 1936–37 European-grown crop was estimated at 863,398 bags, as compared with 1,011,863 bags returned for the previous season in the Agricultural Census of February, 1936. The Kenya Farmers' Association pool, which does not include maize retained on farms, nor maize grown by non-members, amounted to 666,235 bags, as compared with 896,005 bags in the 1935–36 pool. Exports during the crop year July, 1936, to June, 1397, inclusive, as compared with the previous season are shown below:—

	Maize	Maize Meal	Total
	Cwt.	*Cwt.*	*Cwt.*
1935–6.. ..	1,480,186	146,674	1,626,860
1936–7.. ..	948,455	107,163	1,055,618

During the 1936–37 season the London price remained remarkably steady at about Sh. 27 to Sh. 28 per quarter for K2. The ocean freight rate to Europe, however, was advanced to Sh. 37 per ton, subsequently being reduced to Sh. 27/50.

In the early months of 1937 it became apparent that the short-rains crop in the Central Province was going to be small, owing to drought from December onwards. Export was in full swing before the seriousness of the situation was realized, as owing to the possibility of weevil damage the anticipated surplus from the main crop is usually exported soon after the harvesting season. From April 20th onwards exportation was compulsorily suspended except under permit. The price of local native-grown maize which stood at about Sh. 5 per bag at the beginning of the crop year rose to about Sh. 8 at the end of December, 1936, and Sh. 11 at the end of April, 1937. On the harvesting of a good crop in the Nyanza Province from August onwards the price declined again and by the end of December, 1937, stood at Sh. 7 to Sh. 8. The pay-out by the Kenya Farmers' Association for the 1936–37 season was Sh. 7/20 per bag.

The 1937–38 crop in the European areas was grown under generally favourable conditions, though cold wet weather reduced the yield of the later planted portions, and the "Army caterpillar" did some damage in the early part of the season. The European-grown crop for the 1937–38 season is estimated at 1,135,297 bags.

The 1936–37 season was again wet, and the condition of maize presented for grading was even worse than in the preceding season. The grading results are shown in the accompanying table.

STATEMENT OF MAIZE PRESENTED DIRECT FOR GRADING

Year	Total Received	Graded		Rejected				Percentage of Total		
		Slightly Weevily	Total	Weevily	Wet and Musty	Other Causes	Total	Slightly Weevily	Weevily	Wet and Musty
	Bags	*Bags*	*Bags*	*Bags.*	*Bags*	*Bags*	*Bags*			
1933	458,775	80,457	411,974	1,195	41,719	3,887	46,801	17·5	0·3	0·9
1934	205,826	30,347	197,324	4,325	1,686	2,491	8,502	14·8	2·1	0·8
1935	579,447	55,906	559,792	7,473	11,204	978	19,655	9·7	1·3	1·9
1936	837,098	157,073	680,056	64,859	73,186	18,997	57,042	18·8	7·7	8·7
1937	426,649	107,708	354,182	38,430	32,381	6,656	72,467	25·2	9·0	7·6

Owing to the high internal price obtainable, no native maize was presented for grading during the year 1937.

Wheat

The total yield of wheat during the 1936–37 season was estimated by this Department at 222,000 bags. The wheat pool actually amounted to 176,144 bags. In addition to this, seed requirements would account for rather more than 20,000 bags, and retention on farms for poultry feed, etc., and storage losses for much of the remaining difference.

The advance in world wheat prices made it possible to reduce the rebates granted to enable millers to compete with imported flour in coastal markets. In consequence the pool pay-out showed an improvement. It ranged from Sh. 17/05 per bag for Grade 1, to Sh. 9/05 for Grades 12–14. The average for all grades was Sh. 16/17 per bag, as compared with Sh. 13/33 for the preceding season.

Wheat sold to mills during the year October, 1936, to September, 1937, totalled 179,522 bags, at an average price of Sh. 18/40 per bag. These figures compare with 146,970 bags at an average price of Sh. 16/40 per bag in the preceding period. The amount milled has continued to increase, sales to mills during the six months October, 1937, to March, 1938, inclusive, being 95,950 bags as compared with 90,163 bags during the corresponding period of the previous year.

The increased demand from mills has resulted in a situation in which the Colony's production of millable wheat is barely sufficient to meet the local demand. Before the 1937–38 crop was harvested it became apparent that existing supplies would be inadequate. Accordingly Government approved the importation by the agents under the Sale of Wheat Ordinance of wheat up to a maximum of 10,000 bags. The quantity actually imported was approximately 5,600 bags. Government undertook to refund to the Agency the customs duty levied on such proportion of the imported wheat as was retained for consumption in Kenya. It was stipulated that such wheat should be imported under licence from the Director of Agriculture between September 3rd and December 31st, 1937, and that the quantity should not exceed the shortfall of local supplies below milling requirements. Similar action was taken by the Governments of Uganda and Tanganyika Territory. At the same time the Kenya and Uganda Railways and Harbours agreed to transport the wheat at the rate applicable to local produce.

The 1937–38 crop was estimated by the Department at 237,558 bags, as compared with 222,000 bags in the previous season.

During the year certain complaints were lodged by an Indian milling firm concerning the operations of the Kenya Farmers' Association as Agents under the Ordinance. It was alleged that rebates had been improperly granted to a particular mill and that the Kenya Farmers' Association had taken advantage of its position as Agents under the Ordinance and at the same time as millers on a large scale to the detriment of competitive mills, by discrimination in the matters of grades of wheat supplied and in other ways. The complaints were investigated by a chartered accountant nominated by the complainants, and by the Agricultural

Economist. An instance of a rebate being improperly granted was discovered, the amount involved being £206. There was nothing to suggest that this was not due merely to an inadvertence on the part of the subordinate staff of the Agency. With this exception no evidence in support of the charges was discovered.

The development of the native market for bread was the subject of inquiry by the Marketing Officer, in response to a resolution by a sub-committee of the Wheat Advisory Board. The Marketing Officer found that there was a considerable demand for bread on the part of natives living in Nairobi. The demand was met chiefly by retailers who bought loaves at sixteen to the shilling and retailed them at cents 10 each. The loaves varied in weight from about 4½ oz. to nearly 8 oz. It was felt that legislation prescribing the minimum content of the loaf was desirable. In view of the fact that a baker was endeavouring to establish a trade in the native location for 8-oz. loaves retailed at 10 cents, and to the fact that the wheat crop would barely suffice for existing requirements, the matter was left in abeyance for the time.

A small amount of wheat was grown by natives in the Embu and Meru districts and was purchased by an Indian trader in the area, the Agents subsequently accepting the wheat at a price of Sh. 14/50 per bag f.o.r. The trader issued seed wheat free of charge, installed a mill and driers and expended much time and money in developing production in the area concerned. Some wheat is grown by natives in Machakos District also, and in certain localities in the Northern Frontier Province.

Sisal

The overseas market stood at about £28 per ton for No. 1 at the beginning of the year, at about which level it had remained throughout 1936. It remained steady until September, when a rapid decline set in, the price falling to £20 by the end of December.

Exports of fibre and tow during 1937 fell appreciably below those for the preceding year, reaching only 31,275 tons as against 34,746 tons in 1936. The declared value at the port showed a drop from £690,459 in 1936 to £673,719 in the year under review.

When, during the period from 1935 onwards, the price of sisal rose from a low point of about £14 per ton up to about £28, ocean freight rates were increased from £1-10-0 per B/L ton in 1931–34 to £1-17-6 in 1936. During 1937 successive increases brought the rate finally to £2-5-0 per B/L ton. When the price fell towards the end of 1937, this rate became a serious burden on the industry. It is gratifying to be able to state that at the time of writing the rate has been reduced to £1-17-6, though even at this level the ratio of freight rate to price is appreciable higher than was the case previous to the depression.

Government Notice No. 57 of 1937 prescribed standards of grading for sisal fibre and tow, and provided for the use of an East African Sisal Association mark by exporters.

Tea

The area under tea increased again slightly under the terms of the International Restriction Scheme, from 13,176 acres at the end of 1936 to 13,514 at the end of 1937.

With the progress of plantations towards maturity a further increase in production was registered. Receipts into stock-room during the Agricultural Census year March, 1937, to February inclusive, totalled 11,023,511 lb. as compared with 9,043,124 lb. in the preceding period.

Exports of tea amounted during the calendar year 1937 to 81,835 cwt. (9,165,520 lb.) valued at £466,872, as compared with 67,099 cwt. (7,515,088 lb.) valued at £335,690 in 1936.

The average price realized for Kenya tea on the London market increased steadily from the level of 1936, about Sh. 1 per lb. up to August, 1937, when it was well above 14d. From that time it declined, and at the end of the year stood at about 13d.

The Tea Cess Ordinance came into operation during the year. This provides for the collection of a cess on all tea manufactured in the Colony, the proceeds to be used for the general benefit of the tea industry.

Sugar

The production of crystallized sugar during the period 1st March, 1937, to 28th February, 1938, was 317,720 cwt., as compared with 315,660 cwt. in the preceding period.

Exports of sugar (raw and crystallized) during the calendar year 1937 amounted to 92,821 cwt. valued at £51,341. The corresponding figures in 1936 were 131,904 cwt. and £76,301.

A further increase in local consumption took place. Apparent consumption of refined sugar, calculated from production (deliveries from stock room), inter-territorial transfers, imports and exports, for the period September–August (used in connexion with the International Restriction Scheme mentioned below) has risen from 181,000 cwt. in 1932–33 to 315,000 cwt. in 1936–37. These figures are approximate only; there are inter-terrtiorial complications in taking one portion of the Customs Union alone, but the figures for Kenya and Uganda together have risen from 260,000 cwt. to 523,000 cwt. in the same period.

In May the International Sugar Restriction Scheme was entered into by the United Kingdom on behalf of the Crown Colonies among other parts of the Empire. An export quota of 27,000 tons was allotted to East Africa (Kenya, Uganda and Tanganyika Territory) as a whole. The allocation of the quota among the various mills was discussed at a meeting presided over by the Secretary to the Governors' Conference in July. At this meeting a resolution was passed to the effect that the quota should be allotted in proportion to the previous highest year's production of the individual mills, with certain modifications to meet individual cases. The resolution was not unanimous. At a further meeting held in October agreement was reached as to individual quotas. As the year progressed it became clear that the allocation would present no difficulty, as consumption was increasing so rapidly that there was a prospect that the export quota would not be required in full.

As from September 1st, when the Restriction Scheme came into force, an order was issued under the Customs Management Ordinance, prohibiting the export of raw or crystallized sugar to places outside the three territories, except under permit from the Director of Agriculture.

Wattle Bark and Extract

Exports of bark showed a decrease as compared with the preceding year, the quantity exported being 201,653 cwt. as compared with 240,914 cwt. in 1936. The declared value fell from £48,747 to £45,484.

Exports of extract, on the other hand, increased from 119,272 cwt. to 123,632 cwt., the corresponding value being £64,298 and £75,756 respectively.

The overseas price of chopped Kenya bark stood at £6-16-3 per ton at the beginning of the year. In May it was raised to £8, and in June to £8-12-6, where it remained until the end of the year. The price of extract was advanced from £16 per ton at the beginning of the year to £19 in July. It could not be maintained at the price, however, and was reduced to £17-10 in December.

The price paid for dry bark at Thika stood at Sh. 45/92 per ton at the beginning of the year. After the "close season" during the long rains it was raised to Sh. 61/60 in May and to Sh. 72/80 in August. It remained at this level until stripping was suspended during the short rains.

Pyrethrum

Owing to the wet cold weather experienced the pyrethrum crop did not flower heavily and in spite of a probable increase in area planted exports during 1937 amounted only to 19,413 cwt. as compared with 20,798 cwt. in the previous year. With an improved overseas price, however, the value rose to £59,815 from £47,905 in the previous year. The greater part of the exports were taken by the United States of America.

The overseas price exhibited a gratifying rise, from £68 per ton at the beginning of the year to £94 at the end. With the efforts made to ensure a high pyrethrin content in the material exported the premium over Japanese flowers was fully maintained. It stood at £21 per ton or 45 per cent in January, and at £32 or 52 per cent in December.

The Pyrethrum Board continued to act during the year, with the Kenya Farmers' Association (Co-operative), Limited, as agents. The pool pay-out during the year ending March 31st, 1937, was cents 30 per lb. for first grade. As from April 1st, 1937, the initial pay-out was fixed at 40 cents per lb. for first grade flowers and 30 cents for second grade. In August an increase was made to 45 cents and 35 cents for first and second grades respectively.

The policy of the Board with regard to local sales has been to sell powder at a stated percentage over export parity at the time. In May it was decided that, having regard to the increase in overseas price, powder should be sold locally at 10 per cent instead of 20 per cent above London parity.

The ocean freight on baled pyrethrum flowers was increased as from May from Sh. 60 to Sh. 75 per 40 cubic feet.

Passion Fruit

A start was made to put the industry in a position to undertake export business. A Passion Fruit Ordinance was assented to in May (Ord. No. XI of 1937) providing for the appointment of a control Board and of an Agency, prohibiting export of fruit except through the Agency, and providing for the registration of all growers for the purpose of selling fruit for export. Power was taken to impose a levy on all passion fruit grown in and exported from the Colony, for purposes such as experimentation, advertising, expenses of the Board and other approved purposes.

Rules under the Ordinance have been prepared, and the Kenya Farmers' Association have been appointed Agents. The number of growers registered with the Board at the end of the year was 56, and the area stated by them to be under passion fruit was 939 acres. In addition a number had registered with the District Commissioners of their districts but had not registered with the Board. Three factories were in operation, one at Sotik, one at Hoey's Bridge and one at Lugari. A further factory is being erected at Kitale.

Cotton

The 1936–37 season closed with a yield of 22,925 bales as compared with 16,165 bales in the preceding season. The increase took place chiefly in the Nyanza Province, where much progress was reported in the southern parts of the Lake shore regions.

Prices received were extremely favourable. American Middling was quoted at 6.92d. on spot in Liverpool at the end of December, 1936, and by the end of March had risen to 8.03d. Kilindini quotations opened at about 60 cents in December and had risen to about 70 cents by April. Growers received prices ranging up to 15 cents per lb. for first quality seed cotton.

With the publication of the "bearish" American crop forecasts from August onwards prices fell disastrously and by the end of September American Middling spot, was down to 4.89d. Kilindini quotations fell to slightly over 40 cents and the price to the grower to 8 cents to 9 cents at ginneries.

Growers experienced severe disappointment at the heavy fall in price, after the remunerative price of the preceding season, and their enthusiasm evaporated. Weather conditions, also, were less favourable than in the preceding season. The crop was a partial failure on the Coast due to a spell of dry weather in the early growing season. In Nyanza Province, on the other hand, the crop suffered from cold wet weather. As a consequence, the yield in the 1937–38 season showed a decrease to 20,910 bales.

Legislation relating to cotton growing, buying and ginning was consolidated during the year in the Kenya Cotton Rules, 1937 (Government Notice No. 273). These rules provided for control of issue of seed, dates of planting and uprooting, siting of buying centres, prices paid to growers, erection and operation of ginneries, etc.

Production in Kenya during the last eight seasons is given in the table below, which does not include non-native production:—

Year	Nyanza Province	Coast Province	Central Province	Total Production
	Bales	*Bales*	*Bales*	*Bales*
*1930–1 ..	740	43	—	387
1931–2 ..	1,257	487	—	1,735
1932–3 ..	3,219	1,057	—	4,276
1933–4 ..	5,690	1,059	—	6,749
1934–5 ..	7,206	1,567	—	8,773
1935–6 ..	11,830	3,730	223	15,783
1936–7 ..	17,840	2,840	1,486	22,166
1937–8 ..	16,801	4,550	1,559	20,910

*The first year shown is the year of planting; harvesting and ginning extends into the following year.

Animals and Animal Produce

The year was a favourable one for stockowners, rain being adequate and well distributed.

A Meat and Live Stock Inquiry Committee, appointed in 1935 reported during the year. The Report stresses the need for an export outlet for chilled beef, meat products, frozen lamb and frozen pork. The formation of a Meat Control Board was advocated. As a result of the recommendations of the Committee negotiations were entered into with Messrs. Liebig with a view to the establishment of a factory for the manufacture of meat products from low-grade cattle, chiefly of native origin. Negotiations were also commenced with certain firms with a view to the establishment of a freezing works to deal with better class chilled beef and frozen lamb and pork from European farms for export.

A meat extract factory was duly erected by Messrs. Liebig at Athi River and was nearly completed by the end of the year. A start was made to deal with the overstocking problem in native reserves by the promulgation of the Crop Production and Live Stock Rules, 1937 (Government Notice No. 90 dated 14th December, 1937). These rules provided for the declaration of certain controlled areas, within which cattle may not be depastured without a permit from the District Officer. All cattle grazed under permit must be branded according to a schedule indicating the location concerned. The maximum number of cattle which may be grazed was laid down. The depasturing of goats in one area was prohibited except under permit. Provision was made for the elimination of surplus bulls, mature oxen not used for draught purposes or for bleeding for food, and barren and incapacitated cows. Cattle confiscated for a breach of these Rules are to be sold by public auction.

Butter

The total production of butter as given in the Monthly Trade and Information Bulletin, amounted to 3,367,025 lb. as compared with 3,412,904 lb. in 1936 and 2,555,350 lb in 1935.

Of the amount produced in 1937, 2,131,783 lb. was produced in creameries and 235,242 lb. by private producers. The corresponding figures in 1936 were 3,118,303 and 294,601 and in 1935, 2,278,858 and 276,492.

The Butter Levy Ordinance was continued in operation during the year. The quantity of butter sold locally and the assistance provided by local sales to exports were as follows:—

Year	Quantity of Butter on which Levy was Received	Subsidy on Butter Exported
	lb.	*Cts. per lb.*
1933	606,285	20·555
1934	662,913	15·319
1935	586,920	8·386
1936	585,067	5·250
1937	675,556	7·250

The price of butter in London continued its upward tendency, when allowance is made for the normal seasonal variation. The price of New Zealand First Quality was Sh. 113 per cwt. at the end of December as compared with Sh. 105 a year earlier. The pay-out made by the Kenya Co-operative Creamery, Ltd., for butterfat supplied was about cents 70 per lb. at the beginning of the year. In February it rose to slightly over cents 80 and from July onwards rose further to a maximum of Sh. 1/08 in October, declining again to Sh. 1/02 in November and December.

The scheme suggested by the Dairy Industry Inquiry Committee, referred to in last year's report, was embodied in a draft Bill. It received some support from the Standing Board of Economic Development but met with much opposition in some quarters. Various modifications were considered during the year, but by the end of the year no finality had been reached.

During the latter part of the year an official of the Kenya Co-operative Creamery Company paid a visit to New Zealand to study the methods of production and handling of dairy produce in that Dominion. His report, published in 1938, embodies much observation which cannot fail to be of great value in relation to the organization and the technical problems of the industry in Kenya.

Hides

The quantity of hides exported during the year amounted to 56,341 cwt. as compared with 52,462 cwt. in the preceding year. The declared values were £196,071 and £123,480 respectively.

The price of hides on the London market in January stood at the favourable level of 9d. per lb. for heavy-weights. It rose to 10¼d. in April but subsequently declined until at the end of the year it had fallen to 7¾d.

Prices at Nairobi at the beginning of the year varied from Sh. 27/76 per frasila of 36 lb. for first quality shade-dried to Sh. 12/92 for fourth quality sun-dried. The corresponding prices at the end of April were Sh. 36/55 and Sh. 21/11 and at the end of December Sh. 23/59 and Sh. 10/73.

The proportion of hides shade-dried showed a further slight increase. The relative particulars are as follows:—

Year	Sun-dried		Shade-dried	
	Cwt.	*Per cent*	*Cwt.*	*Per cent*
1935	54,340	67	26,344	33
1936	28,317	54	24,145	46
1937	29,313	52	27,028	48

Skins

Exports of sheep and goat skins numbered 1,806,565, valued at £104,281, as compared with 1,794,060 valued at £67,137 in 1936.

For the first time a sub-classification of skins was provided in the export declarations. The relative particulars are as follows:—

	Number	*Value* £
Sheep skins (sun-dried) ...	153,965 ...	4,157
Sheep skins (shade-dried) ...	93,566 ...	4,553
Goat skins (sun-dried) ...	1,408,361 ...	86,625
Goat skins (shade-dried) ...	150,673 ...	8,946

Wool

Exports of wool during 1937 amounted to 13,898 centals, valued at £52,633, as compared with 13,026 centals valued at £44,174 in 1936.

Board of Agriculture

The Board met twice in 1937, on the 17th March and on the 19th November. The Animal Industry Standing Committee met twice, on the 16th March and on the 8th June.

The Board discussed the resolutions of the Stock Owners' Conference, cotton seed decortication and the preparation of cattle cake from it, and progress in the

new flax and ramie industries. The regulations governing the movement of pigs and the desirability of applying the Hides and Skins Rules to settled areas were also considered. Other matters discussed were the transport of pigs by rail, the reduction of railway freight on salt and the application of the Cattle Cleansing Ordinance, together with the proposal to enforce that Ordinance in the Thomson's Falls area without the simultaneous application of the Fencing Ordinance. The Board also considered the Meat and Live Stock Inquiry Committee's report, the control of grass fires, the availability to farmers for agricultural purposes of sludge oil, and the possibilitiy of reducing the railway rate for essential oils. The re-organization of the Department of Agriculture, maize prices and the possibility of including more articles, which are used in agriculture, in the list of duty-free articles in the Customs Tariff were also dealt with.

Royal Agricultural and Horticultural Society

The Society held a successful show in Nairobi in June. The only disappointing feature was that certain exhibitors were unable to bring their cattle, owing to outbreaks of disease. Exhibits were staged by this Department, among others. The Governments of Tanganyika Territory, Uganda and Zanzibar also participated.

In collaboration with this Department a maize seed competition was again held.

A large increase in registrations under the Stud Book scheme took place during the year. The milk recording scheme is progressing satisfactorily.

With the co-operation of Messrs. Cable and Wireless, Limited, broadcast talks to farmers were continued, to which officers of the Department contributed.

Locusts

A small swarm of red locusts (*Nomadacris septemfasciata*) appeared in the environs of Nairobi at the end of July. This swarm disappeared as suddenly as it appeared and no damage was done.

Two medium sized swarms from Uganda covering some 8,000 to 10,000 acres, invaded North Kavirondo and the Uasin Gishu Plateau, but damage to crops was slight. Egg-laying occurred in North Kavirondo before the swarms returned to Uganda. Egg masses and the resultant hoppers were completely destroyed by mechanical means.

PART II—WORK OF THE DEPARTMENT OF AGRICULTURE

EUROPEAN AREAS

The Department was re-organized in regard to its coffee services in accordance with the report of Sir Alan Pim. This involved the transfer of Mr. G. J. L. Burton, the Senior Plant Breeder and Experimetnalist, from the charge of the Plant Breeding Services to taking charge of the Coffee Services. Mr. Trench, Senior Coffee Officer, retired from the Department on the formation of the Coffee Team.

Mr. S. Gillett, who was formerly Officer in Charge of the Native Agricultural School and of the field work at the Scott Agricultural Laboratories, and in this way had been doing much of the coffee work under the Senior Coffee Officer at that station, was put whole time on the cultural side of coffee investigations, and was specifically in charge of all the cultural work on coffee at the Scott Agricultural Laboratories and acted as adviser on cultural work at the other stations as well as on matters relating to native coffee growing. An assistant agricultural officer, Mr. Pratt, was also posted to the Scott Agricultural Laboratories to help in the cultural work. A new experimental station was opened on Karimani Estate, Thika, to deal with the problems, both cultural and entomological, of that district. Mr. T. L. McClelland, who had already been fully engaged on coffee under Mr. Trench, was placed in charge of this station. The land for this station and a house was provided on a nominal rental basis by the Directors of the estate. A start was also made with a station for Makuyu District, and a site was chosen on N. Kitito Estates, which the Directors are prepared to let the Department have. The work on this station will be undertaken by the Officer in Charge of Karimani Station. Another station, specifically for dealing with Coffee Berry Disease, was opened at Kepchomo Estate, Nandi, the land was loaned by the Directors of Savani Estate. Mr. E. Cottington, who had formerly been working on the coffee plots on Sotik Estate, Sotik, was placed in charge of this station. The work at Sotik was curtailed mostly to that of variety trials, and Mr. Cottington continued to look after these from Nandi.

Mr. Thorold, the Plant Pathologist who was already concentrating on coffee research on Mount Elgon, particularly with reference to problems connected with "Elgon Die-back", was taken from the Pathological Section and placed in the Coffee Team. Mr. Melville, of the Entomological Section,

whose work had consisted in the reception and attempted breeding of the parasites received from Dr. Le Pelley in the Far East, was taken from the Entomological Section and also placed in the Coffee Team. Dr. Le Pelley on his return, was seconded to the Coffee Team for full time work on coffee. One Plant Inspector (Mr. Naismith Jones) was also taken from the Entomological Section and placed in the Coffee Team to assist the Entomologists engaged on coffee research. Mr. Gethin Jones, Soil Chemist, was taken from the Chemical Section and placed in the Coffee Team as Chemist for coffee research. Mr. C. D. Knight, Plant Inspector, was also allocated to the Coffee Team and took charge of the White Borer campaigns in the Makuyu District. Mr. T. H. Jackson, who had formerly been engaged on investigations into vegetative propagation of coffee, was placed in the Coffee Team as full time worker on vegetative propagation. Dr. Martin Case, the Bio-chemist of the Coffee Board, was seconded to the Coffee Team and continued on the work on which he was formerly engaged.

The following therefore, comprised the new Coffee Team of full time workers inaugurated on January 1st, 1937:—

Mr. G. J. L. Burton, M.C., B.A., Officer in Charge.

Mr. G. H. Gethin Jones, M.SC., Soil Chemist.

Mr. C. A. Thorold, B.A., Plant Pathologist.

Mr. A. R. Melville, B.SC., Entomologist.

Mr. H. Naismith Jones, Assistant to the Entomologists.

Mr. C. D. Knight, in charge of White Borer Campaigns.

Mr. S. Gillett, DIP. AGRIC., Agricultural Officer, Scott Agricultural Laboratories.

Mr. A. M. Pratt, Assistant Agricultural Officer, Scott Agricultural Laboratories.

Mr. T. H. Jackson, Assistant for vegetative propagation.

Mr. T. L. McClelland, M.C., in charge of Karimani Station.

Mr. E. Cottington, in charge of Nandi Station with Dr. Martin Case and Dr. Le Pelly seconded to the Coffee Team.*

At the same time the changes necessitated by the creation of separate services for coffee have had the effect of seriously weakening the Plant Breeding Services and of causing some

*This re-organization had the effect of concentrating and improving the services supplied by this Department to coffee, though the staff for the work required was still somewhat short.

difficulties in other Sections from which officers have been drawn, especially those of Plant Pathology, Entomology and Agricultural Chemistry. Some decrease in elasticity in these Sections was rendered inevitable but dislocation of work has been minimized by the loyal co-operation of all the officers and staff concerned. Although the staff of the scientific sections was reduced, they were relieved of all work on coffee which in some cases had hitherto formed the major part of their work; at the same time the Heads of Sections, who were outside the Coffee Team, were still able to give some attention to and advice on coffee problems when asked to do so. It cannot be said that the work on problems other than coffee has suffered as a result of the formation of the Coffee Team: rather has it brought into relief the extent of the services necessary to deal adequately with such problems.

The annual Coffee Planters' Day was successfully held at the Scott Agricultural Laboratories in September, and field days were also organized at all the three experiment stations. In addition, meetings were arranged in all districts and addresses and advice given at them by various members of the team.

The re-organization left the Plant Breeding Services with only one Plant Breeder, Mr. Lathbury, and a Junior Laboratory Assistant. This is too small a staff for the work required of these Services. Mr. Lathbury, who was stationed at Njoro throughout the year, continued the breeding of wheat, maize and pyrethrum and had general charge and supervision of the field experimental work in the Rift Valley Province. He attended all the meetings of the Wheat Advisory Board.

Mr. J. McDonald, Senior Plant Pathologist, left Kenya Colony on home leave on the 3rd April, 1937, and was subsequently transferred to Cyprus on promotion as Director of Agriculture. Since his departure Mr. C. A. Thorold, Plant Pathologist, has acted in the senior post whilst continuing to have headquarters at Kapretwa Estate, Mount Elgon, in order to be able to continue his investigations into Elgon Dieback and Coffee Berry disease. Mr. Thorold attended committee meetings of the Trans Nzoia Planters' Association and of the subscribers to the coffee experiment fund at Kitale. He attended Field Days on estates at Turbo, Elgon and Kitale and visited numerous farms in the Trans Nzoia, Muhoroni, Nandi, Songhor, Turbo, Kipkarren and Kaimosi districts. He visited Uganda in March and Amani and Lyamungu in July.

Mr. D. C. Edwards, the Agricultural Officer in Charge of Grassland Improvement, was absent from the Colony from March until December.

Mr. Wilkinson continued as Entomologist in Charge throughout the year. Three Plant Inspectors were transferred to the Coffee Team as from the 1st January, 1937, and also Mr. Melville, Entomologist. Dr. Le Pelley returned to the Colony in September after an absence of more than three years and was seconded to the Coffee Team.

There were also several changes in the Chemical Section. The Soil Chemist was seconded to the Coffee Team and the Junior Laboratory Assistant resigned early in the year and was replaced several months later. Mr. V. A. Beckley, Senior Agricultural Chemist, was on duty throughout the year and served on several committees, especially in connexion with pyrethrum and sisal.

In addition to the specialized services already mentioned, the Agricultural Officers stationed at Njoro and at Kitale, Mr. R. S. Ball and Mr. Halcrow, conducted important investigational work and gave useful advisory services to farmers in the mixed farming areas. During the year twelve lectures on farming problems concerned mainly with live stock and dairying were given by the Agricultural Officer, Njoro, to various Farmers' Associations. This officer in addition paid 392 visits to farms and gave advice on agriculture generally. The Agricultural Officer, Kitale, also attended Farmers' meetings at Kapretwa, Londiani and Moiben and also at the Experiment Station, Kitale, in connexion with coffee and passion fruit and he also paid visits to 105 farms. Services of this nature, which are valuable to the Department in that they provide much useful data on which to base policy, are also of considerable value to farmers; a strengthening of these services is more than justified by the need for more diversified farming and the rate at which farmers are actually changing over to mixed farming.

Coffee

The Scott Agricultural Laboratories may be considered the centre of investigational work for the coffee area east of the Rift, but as its climate is not wholly typical of this area, one sub-station has been opened at Karimani Estate, Thika, and a small one also at North Kitito, Makuyu. Apart from the necessity for these sub-stations for cultural, breeding, selection and vegetative propagation work, there are specific

reasons for these two sub-stations; at the Thika station mealybug control can be more satisfactorily studied in the field than at the Scott Agricultural Laboratories, and at Makuyu leaf disease can similarly be better studied.

There are four stations dealing with problems west of the Rift. These are the Kitale Station, the Mount Elgon Station, the Nandi Station and the Sotik Station. The Kitale Station deals with all general cultural and soil fertility problems common to the western areas. The Mount Elgon deals specifically with Elgon Die-back, whilst the Nandi Station specifically with coffee berry disease. The Sotik Station also deals with coffee berry disease but it will be possible to close this station down as soon as the Nandi Station reaches maturity in its work.

Investigational work at the Scott Agricultural Laboratories was of course in full swing during the year, as was that at Mount Elgon and Sotik. Much of the work at Karimani Estate has consisted in getting the experimental areas of coffee into a suitable condition for the kind of work to be done on them and in making the necessary preparations for starting the various experiments. At Makuyu the land has been prepared for the variety and shade trials. At Nandi the coffee is not bearing well, so that experiments, such as those with vegetative propagation, planting variety trials, etc., which do not depend on crop, are receiving most attention. Experiments to improve flowering were also being done. At Kitale, new areas of ground have been prepared for the experiments organized in the new plan which coincided with the formation of the Coffee Team. The original plots are still of great value in observing the effect of a number of treatments, including shade, cover crops, grass manures, varieties, etc.

Cultural Trials

The all important cultural and allied work continued at the various experiment stations. At the Scott Agricultural Laboratories, the centre for the eastern area, a great deal of the work was concentrated, with extensions at Karimani, Makuyu and Kasarini Estates (Kiambu). Planters in all districts also undertook extension work and the grateful thanks of the Department, the Coffee Team and other planters are due to them. The Nandi, Sotik, Kitale and Mount Elgon stations deal with the problems of the western area.

Pruning experiments continue at nearly all stations and are directed towards regulation of crop to what the tree can bear without suffering, and simple methods of pruning to this end on the single stem system were under investigation. Experiments on the conversion of single to multiple also continue, as do experiments with the multiple stem system itself. Other experiments showed that the time of pruning had a definite influence on time and extent of flowering.

Shade tree trials and trials of shade are undertaken at all stations.

Variety type trials of coffee are undertaken on a uniform plan at most stations. These are done both under an outside shade and on both the single and multiple stem systems.

Good progress was made with vegetative propagation during the year. Improved propagators and the use of growth hormones gave outstanding results with the rooting of cuttings. A large scale co-operative grafting experiment was commenced during the year and, although it is still in progress, there is little doubt that the top-working of coffee will be a practical proposition in the majority of districts. A method was evolved during the year for the production of large quantities of vertical wood from selected trees, this will be of great value in multiplying clones by means of cuttings and grafts.

Seeds of different *Coffea* species were imported from Lindi, Amani, Uganda and the Ivory Coast, and planting material of wild coffees growing in the Embu Forest and at Lake Paradise was established at the Station during the year.

Individual tree recording was commenced on a large scale; the results of the first year's work are most encouraging.

All varieties undergoing trial are now being grown on both the single and multiple stem pruning systems. This step has been taken as it is noticed that there is a marked difference in the behaviour of different varieties when grown on the different systems.

At the Scott Agricultural Laboratories the Bordeaux mixture spraying experiment continued to give outstanding results, large increases in yield on all sprayed plots over the control being recorded. Important developments in the method of application of the spray took place during the year, it being found that excellent results could be obtained by applying a smaller quantity of the spray in a more concentrated form with a mist or fog sprayer.

The Box Ridging System

For some years past Mr. W. J. Poppleton of Makuyu has been working on a system of coffee culture which he has called the "Box Ridging System". He claims for this system that several important cultural practices can be done in one operation; these are, that the land is terraced, green manure crops incorporated in the soil, and all the rainfall conserved to each individual tree by the one operation of growing a green manure crop around each tree and digging it in so that it forms a ridge all round each tree. He claimed that this system was his own invention. This was accepted and an honorarium of £100 was paid over to him by the Coffee Board, in return for which he has published full details of the system. The system is being given a trial on the stations where it might be expected to have a beneficial effect. A full report will be issued on these trials in due course. Certainly, in the Makuyu District, where the soil is light, the land often steeply sloping and the rainfall heavy, but only of brief duration, the coffee on which this system has been put into operation appears to have benefitted from it very much.

Liquoring Services

The Liquoring Department of the Coffee Board of Kenya has continued to be of the utmost assistance and value to the Coffee Team. Hundreds of experimental and other coffees have been reported upon, as to their liquor, in a most satisfactory manner and under the somewhat trying circumstances of working in the dark, both as to their origin and purpose. The research work could not be done without this service and the Department is indebted to Mr. Devonshire for the great and unflagging personal interest he takes in this work, without which it would lose half its value.

Application of Phosphates

The investigation was continued into the phosphate status of the red loams of the Central Province and it has been found that phosphates become locked up in these soils and only a small percentage of the total becomes available. The principle of applying this nutrient is therefore to build up capital reserves amounting to, say, half a ton to the acre so that the annual interest available may be adequate. Thereafter phosphates need not be applied for some years. Also when phosphates are applied, they should be well worked down into the soil or they will be retained in the top two or three inches.

Stream Pollution

Another investigation was into the question of the pollution of streams in the eastern area coffee belt by coffee factory effluents. This was undertaken in conjunction with the Public Works Department. Pollution of streams is certainly deleterious for household use and might effect coffee quality when such water is used in down-stream factories. Suggestions as to how to reduce pollution have already been made in the issue of the Coffee Board Bulletin for August, 1937, but a comprehensive report on the whole subject will be issued later. The effect of polluted water on coffee quality is still under investigation.

Coffee Mealy Bug

A survey of the incidence of *Pseudococcus kenyæ* in Kenya and the Moshi District of Tanganyika, and of its correlation with climate and soil and other factors, was undertaken by Mr. Melville and Mr. Gethin Jones. From this survey it seemed that soil conditions were not responsible but that an infestation of *P. kenyæ* was dependent on two factors—a climate warm enough to breed rapidly in, and the presence of the attendant ant, *Pheidole punctulata,* to keep off natural predators. Mr. Melville considered that the infested eastern area formed part of an ecological island suited to mealy bug and that this conception of an ecological island increased the chances of success of biological control. A report on this subject has been published in the May, 1938, issue of the *East African Agricultural Journal.*

Trials of banding greases have become part of the routine work of the Coffee Team at Karimani Estates, Thika, and a report on the first trials has already been issued in the February, 1938, issue of the Coffee Board Bulletin.

White Borer

Two great successful borer campaigns were carried out, during the period under review, in the Makuyu District. The very best spirit of co-operation has been shown by the planters concerned. This is particularly appreciated as the campaign was taking place during very difficult times for planters. Most of the areas infested beyond repair have been cleared of coffee.

Leaf Disease

Two trees, apparently resistant to leaf disease, are under observation and record at Muhoroni, and spraying experiments, both with headland pumps and fog sprays, are in

progress against leaf fall. An interim report has been published in the Coffee Board Bulletin. The sprayed plots gave large increases in yield.

Coffee Berry Disease

Investigations were chiefly directed towards finding a resistant variety. The variety trials at Sotik showed the outstanding resistance of Blue Mountain and Pedang (probably identical with Blue Mountain) and the susceptibility of the other varieties, including French Mission, Kents and Mysore. A native recorder has now been stationed on the plots to record the yield of individual trees amongst the resistant varieties. A major portion of these investigations consists in testing the effect, on resistance of Blue Mountain, of grafting it on to root-stocks of susceptible varieties. This is to discover whether existing plantations should be uprooted and replanted with a resistant variety or whether the more economical process of grafting will suffice. Different methods of renovating existing plantations with new varieties were, of course, important factors of this part of the work. An investigation of the yielding capabilities of resistant types and varieties is also in progress.

An investigation of the environmental conditions, chiefly climate, conducive to coffee berry disease, is also under investigation.

Elgon Die-back

Investigations are proceeding on Mount Elgon into the causes predisposing to Elgon die-back and "Hot and Cold"; some similar work is also being done on coffee berry disease. The position is still that shade is an effective control of Elgon die-back, and certain types have been found resistant without shade, but these are not resistant to coffee berry disease. The use of Blue Mountain under shade would appear to give resistance to both.

MAIZE

The breeding and cultural investigations which have been designed with the object of improving acre yields have been continued at Njoro, Kitale and Kabete.

Maize Breeding

At Kitale and Njoro the breeding was continued of strains showing resistance to White Blight, Ear and Foot Rots and Rust. As in the previous year a large number of single and

double crosses were grown. Results of crosses showed that no significant improvement in yield over the mass selected control seed had been obtained. This lack of improvement in yield can largely be attributed to the small number of disease-resistant lines originally available and to the fact that the Kenya Flat White type of maize is already very cross-bred compared with types in use in America and South Africa, so that the number of possible combinations and chances of increased heterosis are limited. With a view to adding to the number of unrelated lines, exchanges of material, comprising in-bred lines and single crosses were made between Njoro and Kitale and a large number of double and single crosses have been made which will be tested in 1938. It is anticipated that in this way the work will be more fruitful of results in the future.

At the Scott Agricultural Laboratories, mass selection of "Muratha" maize was continued and involved the planting of a large area of bulked seed and a smaller area of selected seed. Although the average yields were low due to the prevalence of disease, the selected seed obtained was distributed to the reserves.

Maize Seed Competition

The Department again conducted maize seed competitions in collaboration with the Royal Agricultural and Horticultural Society of Kenya, under whose auspices the competitions are held. The seed entered for the competitions was planted at Kitale, Njoro and Crater Stream in 1937 and there were eighteen entries at each centre. The yields were high ranging from 17 to 24 bags per acre at Njoro, from 15 to 19 at Kitale and from 14 to 18 at Crater Stream. The fact that a few competitors have almost invariably occupied a high position from year to year in these competitions clearly indicates the value of careful annual seed selection. At the same time it is evident that the competitors have attained a very high average as compared with the general yield, a result which appears to show that the competitions can still fulfil a useful purpose by making the use of high yielding seed more widespread.

Control of Maize Smut

Certain mercurial dusts were used for treating maize seed for the control of smut. The results from the experiment were inconclusive but they indicated that Germisan may be partially effective in the control of smut.

Maize Stalk Borer

Owing to the increased incidence of this pest the Maize Stalk Borer Rules governing the destruction of old maize stalks and the planting of maize between certain dates were enforced. This resulted in considerable reduction in the population of maize stalk borer and little damage was caused during the year. Thus the effectiveness of these rules was again demonstrated in practice.

Maize Storage

It was demonstrated experimentally that the weevil *Calandra* (*Sitophilus*) *oryzae,* L., cannot live in maize under conditions of airtight storage. Though it is stated in literature that maize stored for any lenth of time under airtight conditions will not germinate, 92 per cent germination was obtained from maize which had been stored under such conditions for a period of ten months as against 98 per cent germination of maize stored for a similar period exposed to the atmosphere in the laboratory. The problem of protecting grain stored in bulk from insect attack is of world-wide importance and appears to warrant experiments in airtight storage being conducted on a large scale.

Army Worm

Some hundreds of square miles of land were infested by the army worm but damage to crops was comparatively slight. In certain areas grazing was destroyed and in the Nakuru District some 1,600 acres of young maize was eaten to such an extent that replanting was necessary. It would appear that there is a distinct correlation between outbreaks and periods of high temperature and low humidity.

Maize Experiments

Several maize trials were conducted by the Agricultural Officer, Njoro. The experiment dealing with reversion of arable lands to various grasses was contained and the results clearly showed the high stock-carrying capacity of arable land planted to grass. In another trial the general effect of ploughing in of maize trash was under investigation and indicated the value of this treatment for increasing maize yields, when maize trash is ploughed in in the presence of compost and phosphate. In an experiment to demonstrate the effect of composting, the residual value of compost even in the third year after application was clearly demonstrated. In a manurial trial, the planting of maize in hills with farmyard

manure placed at each hill gave increased yields in the first year over maize planted on land over which the same amount of manure had been spread over the soil and ploughed in.

The Agricultural Officer, Kitale, also reported on several maize experiments in the Trans Nzoia. The green manure rotation experiment started in 1934 was concluded and indicated the value of green manure on maize yields, although the residual effects were comparatively short-lived. In the trial to test the effect of lime with and without humus the yields obtained were low owing to wet weather ploughing and unsuitable weather conditions; it was shown that humus rather than lime was responsible for the increased yields. In a manurial trial to test the effect of phosphatic fertilizers with and without lime and humus, the artificial fertilizer had no beneficial effect and the increase of 50 per cent over the control by the application of cattle manure proved that the soil was in need of such manuring. An experiment to compare the merits of various grasses and treatments applied to old maize land has been laid down at Cherangani somewhat on the same lines as the trial at Njoro River Farm. The idea is to graze the plots individually for three or four years thus obtaining useful information on the carrying capacity of the different grasses the plots then being ploughed up and planted with maize; the relative improvement will be obtained by comparison with the yield of the plot in which maize is being grown each year. The time of planting test at the Experiment Station, Kitale, showed that the best results were obtained from maize planted by the end of April.

The reports of the Agricultural Officers, Njoro and Kitale, on the experimental work in the Nakuru and Trans Nzoia districts for 1937 were published in the Press in March, 1938. This was done in order that the results of the work should be made available to farmers at the earliest possible moment.

Wheat

The acreage sown in 1937 was approximately equal to that sown in 1936 and the yield is estimated at $3\frac{1}{2}$ bags per acre. 3,000 bags of wheat No. 58 were issued to the medium and lower altitudes and this wheat generally gave satisfaction. Unfortunately the issue of this strain coincided with the appearance of a further form of stem rust to which it was susceptible but this new form where present was severe only in a few cases. On the whole, damage by rust was not great.

Black Chaff was very severe in the early sown wheat that experienced wet growing conditions; wheat which experienced wet weather at the time of flowering was observed to be severely attacked. No variety appeared entirely resistant but there were marked degrees of susceptibility between varieties.

An invasion of Army Worm at the lower altitudes caused some damage to the young wheat and it was necessary to re-plant 2,000 acres.

While the Plant Breeder is mainly responsible for the investigational work on wheat which is being conducted at Kabete, Njoro, Molo and Rongai, reference must also be made to the collaboration of the Plant Pathological Section which conduct routine stem rust tests and maintain pure cultures of the four physiologic forms of rust that are used to obtain artificial epidemics in the wheat breeding cages.

Wheat Breeding

The important factor in the breeding work has been the general appearance of a fifth form of stem rust, which would appear to be the same as the form discovered in 1936. Most of the hybrids and present varieties show a varying degree of susceptibility to this new form though in most cases this susceptibility is a moderate rather than a full one.

Certain wheats are markedly resistant and amongst these are Reliance and Thatcher. In addition one of the new hybrids now in the hands of growers also showed resistance to this and all other forms. The above three wheats have been embodied in crosses made in 1935 and subsequent years and it is hoped that these series of crosses will deal with the problem of this new form of stem rust. In addition a number of these new crosses have been re-crossed in the F_1 generation so that further additional characters might be added.

The collection of Kenya Australian crosses received from New South Wales all showed susceptibility to this new form of stem rust but they have been embodied in the above crosses for their strength of straw, resistance to leaf rust and earliness.

In addition to the big issue of No. 58, small amounts of several cross No. 130 strains were issued to growers for trial and multiplication and promising results have been obtained in some cases.

Further samples were sent to Dr. Kent-Jones for analyses of baking quality and a number of Pelshenke wholemeal tests were made at Njoro.

Take-All

The wheat Take-All experiment mentioned in the last Annual Report was continued. Wheat was planted on land originally badly infected with Take-All which had been under grasses for years, the grasses comprising both indigenous and exotic species. There were no obvious symptoms of Take-All on the wheat in these plots although in one or two cases there were indications that it might be present, more particularly in the case of the plot following Kikuyu grass. In addition an experiment to devise a suitable rotation of crops for the eradication of Take-All was continued.

As advocated last year, a number of Take-All infected wheat fields at the higher altitudes have been planted with pyrethrum.

Oats

The Australian variety Lampton maintained its stem rust resistance. It has also shown resistance to smut in this country and has met with the approval of growers. The other imported varieties from India and South Africa all proved highly susceptible to rust.

Barley

In view of the fact that the commercial varieties in this country have largely lost their purity, fresh stocks have been imported by the Department. "Chevalier" barley suits Kenya conditions better than the "Archer" barleys. Seed of a variety from Australia called Pryor, which is of the early maturing Chevalier type, has been imported and grown, whilst a very small stock of the true later maturing type was obtained after a world-wide search from the National Institute of Agricultural Botany, Cambridge.

An experiment was carried out at the Scott Agricultural Laboratories on covered smut of barley. The seed was artificially infected with smut spores and was then treated with three disinfectant dusts, including Agrosan G. These dressings were all successful in controlling the smut but so little smut developed, even in the untreated control rows, that further confirmation of the merits of the treatment will be necessary.

Sisal

At the request of the Sisal Industry Committee, research work was initiated into the retting of flume tow, the industry paying the salary of an officer to undertake the work under the direction of the Senior Agricultural Chemist. The cause

of earlier failures was recognised and soon perfect retting by normal methods was secured. Unfortunately the application of these methods is not economic on a large scale but further work has produced a new method of retting which is successful and economically possible. It is considered that these investigations will prove to be of considerable value to the sisal industry.

In addition estimates of expenditure were prepared for the establishment of a high level sisal research station which it is proposed to start in the vicinity of Thika. When this station is in being the industry will be well served from the point of view of research.

Research into new uses for sisal is being actively pursued at the Linen Industry Research Association's institute at Lambeg. Agronomic problems at low elevations are being conducted at the research station at Mlingano in Tanganyika Territory, and the research station at Thika will similarly serve sisal growers in the Highlands. All this work has the support of the Kenya Sisal Growers' Association. A committee comprising members of the Sisal Industry Committee, Kenya Sisal Growers' Association and the Department of Agriculture has been formed to control this sisal research work. The results of sisal investigations are conveyed to the growers immediately they become known.

Pyrethrum

The sale of pyrethrum under a guarantee of a minimum pyrethrin content of 1.30 per cent was established during the year and at once resulted in a premium of about 45 per cent over Japanese pyrethrum. In order to ensure that the standard is maintained a system of sampling has been introduced. Samples are drawn at the time of baling and then combined and a sample representative of a lot of 25 tons is used for analysis upon the results of which is based the guarantee.

The collaborative work between Dr. Gnadinger in the United States of America and the Senior Agricultural Chemist in Kenya was continued. It was determined that during transit to the United States of America, pyrethrum loses on the average 1.4 per cent moisture and that the loss in pyrethrins is 6.3 per cent of the average pyrethrin content calculated on the dry basis.

The copper reduction method of assay, which is employed at the Scott Agricultural Laboratories, has given rise to some adverse criticism. This method, however, is the only one suitable to our conditions. It is as accurate as any other, and gives reproducible results.

About the middle of the year there was a marked drop in the average pyrethrin content of flowers. It was found that consignments contained unduly high proportions of immature flowers and in consequence stringent grading rules were enforced rapidly leading to a marked improvement. Immaturity was not alone responsible for this drop in pyrethrin content, for certain observations led one to suppose that the long continued rain had had a deleterious effect. It has also been suggested that the advancing age of plantings had reduced the pyrethrin content but analyses of flowers derived from fields of various ages have failed to substantiate that the pyrethrin content decreases with the age of the plant.

Investigations are being continued with the object of maintaining and improving the high reputation of Kenya flowers.

Pyrethrum Breeding

The work of the Plant Breeder in the selection and breeding of pyrethrum reached a further stage during the year. Weighed pickings from selected strains were made for yield tests and, in collaboration with the Chemical Section, analyses of the pyrethrin centent of the more promising lines were made. The pyrethrin content figure was found to range from 1.01 per cent to 1.78 per cent, a variability sufficiently great to indicate that improved strains will be evolved by breeding.

Although the preliminary crosses have produced nothing of immediate value, further crosses embodying the best of the high pyrethrin content lines have been made.

Cultural Experiments

The investigational work on this crop has been conducted mainly at the high altitude plots at Molo and it has embraced manurial and spacing experiments, the planting of splits as compared with seedlings and the effect of the cutting back experiment has given fairly definite results and has indicated the correct height to which plants should be cut back.

The experiment on the use of root divisions as opposed to seedlings for establishing new plantations showed that while root divisions come into bearing at a much earlier

stage than seedling material, yet there are indications that seedling material may give better yields subsequently. In the manurial experiment the effect of repeated applications of mineral fertilizers and organic manures on land of moderate fertility again clearly showed that the largely increased weed growth increased weeding costs with a consequent tendency towards the reduction of the stand.

Drying

The Ainabkoi drier has continued to form the subject of investigation and it has been improved due to a joint study made by Mr. R. O. Barnes and Mr. McNaughtan (Agricultural Chemist, Pyrethrum). There has been a marked improvement in the appearance of pyrethrum flowers due to the wider use of this drier.

Diseases

In certain areas premature browning of pyrethrum flowers occurred which resulted in these flowers being placed in the second grade with consequent financial loss to the grower. Investigations have shown that the disease is sometimes associated with thrips but it has not yet been decided whether *Thrips tabacci* or the fungus *Alternaria* sp. is the primary cause. Further experiments are in progress by the Plant Pathologist and Entomologist.

PASSION FRUIT

This agricultural industry has required increasing attention from the Department. At Kitale a large range of experiments has been planned and some have been started. Vines which were planted in 1936 were recorded individually for yield and resistance to disease. The new experiments have been designed with the object of studying comparative soil treatments such as composting, clean-weeding, mulching and green-manuring, to study the merits of different pruning systems and to investigate the effect of soil deficiency on the plants.

Diseases

A disease of passion fruit which is under active investigation at the present time is that known as "woodiness". This disease, which has been found to occur in various parts of Kenya, is believed to be a virus disease and it is being investigated by officers of the Department and by Dr. H. H. Storey, Plant Pathologist, Amani, who is a specialist on virus diseases. It is probable that the remedy for the disease will

lie in the use of resistant or immune varieties of strains, and this work of breeding and selection is consequently engaging out attention.

The interests of the industry are being watched by the Passion Fruit Board, not only as regards the marketing and quality of the juice, but also in regard to the investigational work of the Department and the measures which it is necessary to adopt in order to combat pests and diseases.

Tobacco

Unfortunately conditions at the Scott Agricultural Laboratories were not suitable for the work on the high nicotine content tobacco; growth was very poor. Arrangements have been made for collaborative work between the chemical section and the Plant Breeding Station at Njoro.

Interest in tobacco for nicotine production increased during the year and a number of farmers in the Njoro District started to grow it.

Miscellaneous Cash Crops

Flax

The acreage under pedigree flax varieties showed little increase during 1937 and it is estimated that about 530 acres were planted in the Nakuru District although results for the previous year had been financially satisfactory to growers. This lack of expansion was probably due in large measure to the fact that other crops obtained good prices and farmers were therefore reluctant to plant flax which they consider requires considerably more handling at harvest time than other crops. The variety Liral Crown was grown to the exclusion of all others with the exception of a small acreage of Stormont Gossamer.

Diseases.

Control plots were grown at Njoro, Molo and Upper Solai in order to test susceptibility to rust; the varieties used were Liral Crown, Liral Monarch, Stormont Gossamer, Stormont Cirrus and Liral (Giza) Purple (two varieties). The heaviest infection of rust occurred at Molo and all varieties showed a susceptibility to it. Neither of the Stormont varieties were so heavily infected as the Liral varieties and while the first importation of Giza Purple showed only a few pustules the second importation, which was very mixed, showed a high percentage of rust infection. In no case this

year, either on plots or on farmers' fields was any infection sufficiently heavy to cause appreciable damage to yield or quality of the seed. In a few instances the pustules were sufficiently large to cause damage to the fibre.

Germination of Seed.

An experiment was carried out at the Plant Breeding Station, Njoro, to test the effect of three disinfectant dusts on linseed before planting. Both yield and germination were improved by the use of the three seed dressings, including Agrosan G. supplied by Imperial Chemical Industries, Limited.

Similar experiments at Kitale gave no result beacuse no rust occurred in any of the varieties.

Cultural.

The rate of seeding experiments in the Nakuru and Kitale districts indicated that a seed rate of 30–35 lb. per acre of Liral Crown was desirable but owing to unfavourable harvesting conditions this result cannot be considered to be definite.

Experiments on different methods of handling the straw for fibre were conducted in the Nakuru and Kitale districts. Various methods of stooking and shade drying were tried and the samples obtained by these various methods have been sent to the Linen Industry Research Association at Lambeg for examination.

General.

The samples of seed harvested by farmers were of high quality and of good germinating capacity and seed was maintained in pure condition. Unfortunately much was harvested too late in the year to arrive in Belfast in time for the 1938 market and it may be necessary to hold over some of the crop from year to year so as to ensure its arrival at the best time. Samples which have been stored for ten months in Kenya showed no deterioration in quality or germinating capacity.

In addition to the production of seed, several farmers are interested in the production of fibre which if it could be satisfactorily prepared and handled might increase the profit from the crop. With this end in view it is anticipated that an expert in flax will pay a visit to this country in 1938; arrangements for such a visit were well advanced by the end of the year. Flax could form a very useful alternative crop in certain areas of the Colony.

Ramie

Further inquiries and investigations were undertaken with a view to the production of ramie fibre for export. While the plant grows well in Kenya and the fibre commands a high price, the main problem is to discover a cheap and satisfactory method of decortication. No simple way of producing the fibre has been discovered. Trials conducted by the Senior Agricultural Chemist resulted in a method being evolved for facilitating the removal of the bark but the cuticle still adhered strongly to the fibre. Retting was also tried both on decorticated bulked strips and on the whole stems but under this treatment the fibre tended to break down. There is reason to believe, however, that a suitable decorticating machine will eventually be evolved and investigations are being continued with this object in view. Meanwhile it is still regarded as being in the experimental stage.

Beans

The selection of strains of beans resistant to bacterial blight has been continued in the Nakuru District; the beans under trial have been Rose Coco, Canadian Wonder and Madagascar Butter Beans. In a comparative trial with the Canadian Wonder variety, the resistant strain gave a yield of 4.2 bags per acre as compared with a yield of 3 bags per acre in the case of ordinary Canadian Wonder seed. Seed of the resistant strain issued to farmers showed slight infection during the heavy rains but in no case was there failure to harvest a reasonable crop. It is clear, however, that the selection work should be continued in order to build up a higher degree of resistance.

Soya Beans.

A considerable number of varieties of soya bean were under trial at Njoro during the year, but yields were very disappointing. Of the varieties tried Busa and Greenish Yellow were the most promising and will be tried again in 1938. The varieties Huberschach, Midwest and Herman were found to be suitable for issue in 1938 for trial in native reserves. At Kitale the variety Greenish Yellow was unsuccessful. The varieties Sclamat and Java Nos. 27, 29 and 30 were not considered to be worth further trial at Njoro, but will be bulked at Kitale in 1938.

Kweme Nuts

As a result of its successful cultivation in Tanganyika, interest in this crop was aroused in Kenya. Seed was distributed to a number of farmers who had asked for it and to

several of the Department's stations, for trial. An inquiry with regard to the development of an export trade was received from the United States of America. The full commercial possibilities of this crop are being investigated. It is probably a suitable crop to replace coffee in marginal coffee areas.

Forage Crops Experiments

Experiments with sprouted grain were concluded when the method of preparation proved successful. Sprouted grain is now recommended as a cheap, succulent feed under conditions in Kenya, the method of preparation being simple and inexpensive.

Preliminary trials with the preparation of young dried grass indicated that this process is only likely to be of limited application for Kenya conditions. Further trials will be made.

A wide range of trials were conducted with silage crops and mixtures. Various treatments were applied and clearly demonstrated the value of molasses for the ensiling of material such as vetches and Napier grass.

At Njoro and Rongai further trials of forage crops were carried out and the experiments showed that high tonnages of green succulent forage can be obtained from Napier grass under the conditions obtaining. The value of such crops as kale, Hubam clover and vetches was also clearly demonstrated.

In the case of forage crop trials conducted at Thomson's Falls on selected poor soil, the value of the Purple vetches for such conditions was shown to be outstanding.

Other forage crops tried included cowpeas, Spineless cactus and Wintersome, all of which gave promising results at Rongai.

Pasture Research

During the year some progress was made in the trials of recently acquired pasture plants, and in this connexion *Astragalus venosus* has given some promise as a pasture legume, although lucerne and possibly *Indigofera tettensis* remain the most useful types for sowing in mixture with the grasses. A giant *Cynodon* species has proved successful over a considerable range of climatic and soil conditions and may be valuable in the lower-lying native areas and also in soil erosion control measures.

Particular attention is being paid in the work to ecotypes of *Chloris gayana* and *Pennisetum clandestinum* and to species of *Cynodon.*

The main object of the work at Kabete is to provide grass and legume types suitable for use in grass-arable rotations, which are an important requirement of the development of mixed farming in both European and native areas.

Towards the end of the year an experiment in control of grazing on extensive lines was started on the Yatta Plain. This is an area of low rainfall occupied by the Kamba native tribe.

The experiment at Njoro River Farm continued to demonstrate the high stock-carrying capacity of arable land planted down with grass.

At Njoro trials with grasses have continued and a large *Cynodon* species obtained from the Kikuyu Reserve has given indications of considerable promise. In a fertilizer trial on Kikuyu grass, sulphate of ammonia gave a slight stimulus during the rains; the very important factor of humus in the successful cultivation of this grass was again demonstrated. In the trials in which small fields of Rhodes grass, *Paspalum dilatatum* and *Phalaris tuberosa* are closely grazed it is becoming evident that Australian Rhodes grass should be regarded as a grass suitable for short term leys rather than permanent pasture.

Amongst a series of grasses tried in the large-scale trials at Rongai, Australian Rhodes grass produced a large volume of herbage in the first year and molasses grass proved drought resistant. The naturally reverted Star grass pasture proved as successful as any of the established species.

Under selected poor soil conditions in the grass plots at Thomson's Falls, all the plots of Australian Rhodes grass, *Paspalum dilatatum* and *Phalaris tuberosa* have proved disappointing and there has been a rapid incursion of indigenous species into all plots.

The grassland rejuvenation experiment conducted at Forest Farm, Njoro, indicated the advantage of thorough cultivation and aeration of the soil for the encouragement of stoloniferous species.

In the large-scale trial plots at Molo, it was again shown that certain mixtures of English and Australian species are suitable for short-term leys in the very high altitude areas.

The Agricultural Officer, Njoro, also conducted small grass and leguminous pasture plant trials; various indigenous and exotic legumes and pasture plants were tried and considerable promise was shown by an indigenous *Glycine* species from Ulu and *Tephrosia* spp. from Songhor. Sheep's Burnet appeared to have some value as a constituent of a pasture mixture for the high altitude areas.

At Kitale Experimental Station the intensively grazed paddocks, consisting of two acres in Kikuyu grass and two in natural veld, carried five head of native stock throughout the year supplemented by Napier grass from ½ acre in the dry season and a little maize silage. Certain species of grass in the natural veld were shown to be very drought resistant. In a trial with artificial fertilizers, sulphate of ammonia showed a beneficial effect for some seven months. In the trial of pure strains and mixtures of grasses, which has been conducted for some years, the outstanding grasses were Molasses grass, *Paspalum dilatatum,* Kikuyu grass and Star grass (*Cynodon* sp.). The best plot is one which was originally planted in 1935 with Australian Rhodes grass, Molasses grass, *Paspalum dilatatum,* Tall Oat grass and lucerne, and which now consists of Molasses grass and *Paspalum* almost exclusively.

Investigational Work on Soils

An investigation was conducted into the rates of decomposition and nitrification of a heavy weed growth and of a leguminous green manure. Both materials contained substantially the same quantities of nitrogen in all forms. Decomposition of the green manure occurred at the same rate in each case. Nitrification in the case of the legume (lucerne) was normal and typical. The results with the weed growth were very different. Although it had a big start with respect to nitrate nitrogen the quality of available nitrogen remained unchanged for four weeks and right to the end of the experiment the amount of available nitrogen produced was much less than that from the legume.

This experiment is of far-reaching importance and calls for further investigation. Mere nitrogen content alone does not determine the rate of nitrification. Leguminous green manure nitrifies very rapidly and should the rain be heavy the nitrates will be leached beyond the root zone. Although the nitrogen content of weed growth may be as high as that of a legume nitrification is more gradual and thus such a green manure affects the nitrogen supply for a longer time.

The weed used in this experiment, pigweed (*Amaranthus graecizans*), was found to contain very appreciable quantities of nitrate nitrogen, a condition which persisted right through its life. The presence of pigweed must thus be regarded as an indication of a high nitrogen fertility. In one way it is a beneficial weed, it stores up quantities of nitrate nitrogen which otherwise would be leached away.

Essential Oils

Lavender this year has reached the stage of production. The oil is "English" in character rather than "French" but it will have to compete with French lavender oil. It appears that the demand is greater than the supply.

NATIVE AREAS

Soil Conservation and Fertility

General

In the year under review, the problems of soil conservation and the maintenance and improvement of soil fertility were the first concern of the Department's staff in all areas. Considerable progress can be reported, but the main obstacle which has to be overcome is the native's lack of understanding of the need for the prevention of soil erosion.

Soil conservation measures adopted may roughly be divided into preventive measures on land under cultivation and the reclamation of eroded areas. In addition to these measures, in some areas where erosion of grazing land has been caused by overstocking or injudicious grazing, communal control of grazing was successfully introduced and improvement in soil cover soon became noticeable. Other lines of work of importance were the organized planting of trees in suitable places, the construction of water-holding dams and the protection of water courses. Demonstrations of anti-erosion measures were provided on all seed farms.

The afforestation of steeply sloping land has been encouraged for many years and hundreds of thousands of tree seedlings have been grown and issued by Local Native Councils. Owing to droughts and lack of care the losses amongst seedlings after they had been planted out were frequently large. The policy in the Central Province is now to concentrate on afforestation of steeply sloping land, using trees which will grow from seed planted at stake. *Cassia florida* is being issued in the lower and Black Wattle in the higher areas. Very considerable acreages have been established under trees in this way.

All these soil conserving works have been going on for sufficient time now for their results to begin to become apparent and many elders of native barazas and Councils are beginning to appreciate their value and are becoming more helpful than in the past. Local Native Council resolutions aimed at the control of soil erosion were made in most districts. Legislation is of assistance in bringing the lazier members of the community into line with the more willing and progressive. It frequently occurs that a native cultivator at the bottom of a hill, who has introduced control measures in his field has all his work made valueless owing to the negligence of the careless cultivator of a field on the hill-side above his own.

It is noteworthy that the old native type of hoe is quickly giving place to a heavy English made type and that the use of the ox-drawn plough has increased immensely and is outstripping the progress of education in its correct use.

Soil Conservation in Nyanza Province

In the Nyanza Province, by the end of 1936, it was still difficult to see definite results at any point, but by the end of 1937 definite progress had been made, despite the fact that native cultivators were still, on the whole, unaware of the importance of the work being done. Two main lines were followed, the former being the more important. They were—

(*a*) the efforts of the individual cultivator on land which he was cultivating, and

(*b*) the reclamation of eroded, no longer cultivated areas carried out by paid and voluntary labour.

In the analogy used when explaining these methods to natives it is shown that the first method is comparable to the wise man who takes precautions against illness and that the latter is comparable to the foolish man who, having become ill through lack of precaution, has to go to hospital to be cured.

The methods introduced for use by individual cultivators on their own land were of the usual nature, such as stone terracing, narrow base terracing, contour lines of grass, the control with live hedges of boundary ditches running up and down hills between fields, the reduction of the amount of cultivated land on steep slopes, encouragement of a better conception of land ownership, windbreaks in flat wind-swept places, correct ploughing methods (on the contour instead of the old method of ploughing up and down hill), stall feeding

of cattle and the use of manure and compost, control of grass burning, increased tree planting and the mulching of crops. Success in the application of these methods varied from place to place, the introduction of some being impossible until the native cultivator becomes more conscious of their value.

The reclamation of areas already eroded went on slowly, gangs of paid or voluntary labour being detailed to work in selected, eroded localities. The method adopted was to make contour banks with the object of arresting the flow of water down eroded slopes. These banks were grassed over with creeping grasses, which were found to be good soil binders, and to possess good feeding value, and the spaces between them were also planted with creeping grasses. Cattle are forbidden in these areas for several years. Many locations in the province have a day allotted each week for soil reclamation work. On that day people join voluntary parties to do reclamation work in eroded areas.

Soil Conservation in the Central Province

In the Central Province also, considerable progress was made in 1937. Measures were divided into those taken on cultivated land, those taken on grazing lands and those for the protection of river banks, gullies and other water courses. A large proportion of the land in this province is sloping, but owing to the density of the population it is impossible to prevent its cultivation. As a result of continuous propaganda natives are becoming alive to the danger of erosion and in some areas are now easily induced to take preventive measures. The burning of crop residues, so common two years ago, is gradually ceasing, such residues being laid on contour lines and live wash stops, which include Napier grass, *Sporobolus* sp., *Hyperhaenia rufa* and *Coleus* sp., are being planted below and against these. The cultivation of very steeply sloping land is being prevented whenever possible, such land being converted into permanent grazing or forest.

Large areas of grazing lands have been temporarily closed to stock in the Machakos, Kitui, Embu and Meru districts, under organized schemes of rotational grazing. These restrictions have resulted in remarkable regeneration of natural grass and bush.

Cultivation along the banks of rivers, streams and gullies is being discouraged and gully blocking with stones, wire netting and live plants is being carried out.

Soil Conservation in the Coast Province

In the Coast Province similar work was undertaken in 1937. Good progress was made in the Kau-Ozi rice areas, with measures aimed at preventing the destruction of this valuable land. Growers now hold their land on annual licences, which can be revoked if the steps, advised for the prevention of erosion, are not carried out satisfactorily.

A controlled grazing area was under experiment at Mariakani in Digo District. The worst eroded area is in the Teita Hills, where anti-erosion measures are a matter of the greatest urgency. The District Commissioner of that district has done much to foster tree planting, contour ridging and other measures, but the absence of an Agricultural Officer cannot fail to make progress slower than it should be.

Mixed Farming

Soil fertility is a subject with a close bearing on soil erosion. Mixed farming is the obvious solution to the upkeep and improvement of soil fertility. Everywhere the making of village compost is encouraged, special attention being given to this where cultivators do not own animals.

In the Nyanza Province the extension of mixed farming is at present based on the experience derived from demonstration small-holdings, three of which are in operation at the Department's station at Bukura, one at Maseno seed farm and one at each of the Government African Schools at Kisii and Kabianga. Much valuable work has also been done at the Government African School, Kakamega. Outside these nuclei the spread of sound mixed farming methods has been slow. Undoubtedly the system of land tenure continued to be an obstacle in the minds of natives. The consolidation of existing holdings must first be achieved before real progress in mixed farming is possible. In the year under review much has been done, however, in popularizing certain husbandry methods which form the basis of mixed farming. For example, the production of a plentiful supply of timber for use in house construction and paddock fencing, the construction and correct use of cow sheds, the use of fodder crops, stall feeding particularly in the densely populated areas, the use of manure and compost, the use of better implements and the rotation of crops in the fields of present fragmented holdings are practices which are gradually gaining in popularity. In this connexion it is worth noting that the only

effective method of controlling Striga weed is by the rotation of cereal crops with crops such as cotton, cassava, potatoes, pulses and sesame. In the Kitosh area of North Kavirondo some progress was made in changing the system of maize production in large fields, run by syndicates, which had been adopted by natives, and which resulted in a large increase in maize production, to an individual holding system. The large field system, owing to the lack of skill of the cultivators, was wasteful and unsatisfactory. Towards the end of the year an Assistant Agricultural Officer was posted temporarily in that area with the main object of achieving this change over. Some results were obtained, but they can only be regarded as preliminary.

In the Central Province the introduction of mixed farming methods is of supreme importance in those areas which are so thickly populated now that a bush fallow in the husbandry system can no longer be practised. Every opportunity was taken of demonstrating to natives that stock are an integral part of arable farming and that, provided that soil erosion is prevented, the future of agriculture depends almost entirely on manuring the land.

On account of a better land tenure system in most areas of this Province, more progress in the introduction of mixed farming methods has been achieved than in the Nyanza Province. The results attained in the year under review may be regarded as most satisfactory. Two hundred and forty-two native peasant farmers have progressed so far as to include a grass ley in their crop rotation. The fencing of fields with wattle poles in certain parts of the Kiambu, Fort Hall and South Nyeri districts is now generally practised. Because these fences are only of a temporary nature, the hedging of fields with plants such as Kei Apple, Giant Sodom Apple, sisal and Mauritius thorn is being introduced. It is reported that two thousand and eighteen natives were practising mixed farming methods at the end of 1937. Over one hundred thousand compost pits are now in use.

Extension work includes the demonstration of mixed farming methods on all seed farms. Herds of milk cows, immune to East Coast fever, are kept at South Nyeri and Fort Hall and the production of their milk individually recorded. The introduction of wool sheep to the higher zones is being investigated and to this end four Romney Marsh rams were purchased in December.

Progress can also be recorded in the Coast Province. It has been evident for some time past that the fertility of the light soils of the coastal belt was being endangered, more especially near Malindi, by steady increase in cultivation. This increase has been rapid since the extension of cotton growing, and as the majority of cultivators have no rights in the land, they are practising a form of shifting cultivation with annual crops, which before many years are past may cause serious soil deterioration. This deterioration will increase as more bush is cut and it will be increased still more by the strong monsoon winds which cause serious erosion. To put forward a scheme to combat this has not been easy because landholders are satisfied with the present arrangement and squatters fear to adopt a more permanent form of agriculture lest they be evicted from their land. Accordingly, various proposals have fallen through but in 1937 a further effort was made after the consideration of the position of squatters on Crown land. A scheme is now before Government which aims at concentrating these squatters, at present spread over a considerable area between Kilifi and Malindi, in a block of land near Gede. It is proposed that holdings of about ten acres per family be permanent and that they should be within the limits of certain conditions which aim at preserving soil fertility. In time to come it may be hoped that a tsetse-free area may be formed, which would then permit of stock being kept. It is not practicable to contemplate larger holdings if this objective is to be achieved but the settlement area will embrace an adequate amount of poorer land, which should serve as commonage.

Similar schemes are contemplated for settlements already in existence and it is hoped that in due course landowners will require cultivators on their lands to follow suit in return for some security of tenure. No detailed description need be given at this early stage, but, if the scheme is finally adopted, then it will mark a very important step forward in coastal agriculture.

In Digo District, particular attention has been paid to the coastal belt, where fertility is already at a very low level. A small number of cattle are kept and, the area concerned being free from carnivora, they are tethered at night in the open. This practice has been developed and the use of manure has been fostered with promising results. Cattle

owners appear to realize the value of manure and a further development of the last two years has been the establishment of large numbers of compost pits. There is still some way to go before natives appreciate these measures but steady progress is being made.

In the same area a further line of work is the encouragement of the growing of pigeon peas as a food and soil resting crop. In the past this crop has been used to some extent as boundary lines but efforts are now being made to induce growers to plant up definite areas with a pure crop.

Cotton

The cotton industry has again progressed in the three main agricultural provinces. A new ginnery was opened at Homa Bay. The number of the ginneries in the Colony is now thirteen, of which seven are in the Nyanza Province; two are in the Central Province, and four are in the Coast Province. In addition to these, a ginnery was being erected at Nziu in the Central Province.

The increase that has occurred in the production of cotton in Kenya during the last eight years is shown in the table on page 20.

There was a considerable increase in the interplanting of legumes in the cotton areas of the Nyanza Province, the method recommended and carried out being to plant cotton first and then fill up the blanks in the stand with food pulses. This resulted in a useful supplement to the diet of the population being obtained in areas in which legumes had not previously been largely cultivated. It was recorded from most areas that early drought conditions, which were superseded by liberal rainfall, caused flowering and boll shedding to occur abnormally. Recovery was recorded with the advent of warmer weather. On the light red lands, which predominate in the lower areas of Kitui in the Central Province, it is recorded that cotton will not produce a crop when the period January to March is rainless, irrespective of conditions at planting time, and that cotton on these lands does not recover after cold, dull weather, so that the harvest must be looked for during the period March to May. Cotton was introduced in the Fort Hall–Embu–Meru areas, which are

sparsely populated, to meet the need for a cash crop and in an endeavour to induce the people to come down from the higher areas where the density of poulation is greater. In those areas also most of the crop was interplanted with beans and gram.

Insect pests of cotton did not create a serious danger in 1937. Stainers only occurred, as is usually the case, towards the end of the growing seasons in the Coast and Nyanza Provinces, but in the Central Province, as also is customary, they presented a graver difficulty.

Nyanza Province

In this Province, cotton is the main cash crop. In cotton areas 2 and 3, i.e. the major part of Central and all of South Kavirondo, it is planted in April, May and June; in cotton area 1, i.e. North Kavirondo and a small part of Central Kavirondo, it is planted in June, July and August. Prices for the 1936/7 crop were good, averaging 13 cents per pound for first quality and 5½ cents per pound for second quality. At the end of that cotton growing season the crop was extremely popular in all producing areas and preparation and sowing of the 1937/38 crop was done well, a record acreage being estimated in most areas. Poor weather conditions in some cases adversely affected the deveolpment of the crop, particularly in the south, but at the time of the opening of the buying season towards the end of the year it was anticipated that a fresh record would be achieved. Unfortunately, the price for first quality dropped to 8 cents per pound at ginneries and remained steady at that level until the end of the year, with no prospect of increase at that time. For second quality cotton the price at ginneries was 1½ cents per pound. The response by native producers to these low prices was complete lack of interest and many could scarcely be induced to harvest their crop of second quality cotton. This resulted in much second quality cotton being left in the fields and the percentage of second quality to first quality was considerably less than normal.

In the whole calendar year 1937, however, cotton sales reached a new record. The total production from the 1936 planted crop mainly sold in 1937, was valued at £144,675 to the growers and the total production from the 1937 grown crop, when sales were completed in 1938, was valued at £98,075 to the growers.

Central Province

The crop from the Kitui and Machakos districts of the Central Province, where cotton is sown in October and November, was being sold at the time when the slump in prices actually occurred and, therefore, prices paid at Kitui ginnery for this crop ranged from 9 cents to 18 cents for A quality and from 2 cents to 7 cents for B quality. The yields were, on the whole disappointing. In those districts, the 1937/38 planting season was good but, because of the low prices and poor crops, natives were reluctant to give the crop the attention required in its early stages of growth. In Kitui 7,000 acres, and in Machakos 5,000 acres, were planted in October and November, 1937. In the Fort Hall, Embu and Meru districts of this Province an effective total of 5,000 acres resulted from the 1936 sowing, the product of which was on the market early in 1937. This crop was sold when the earlier good prices were still in force. The 1937/38 crop in these districts, sown in April, 1937, was promising until, at the end of June, it was set back by cold, dull weather.

Coast Province

In the Coast Province particularly, the season was adverse to cotton, both at the time of sowing and in the subsequent stages of development. Sowing was reduced in extent and was delayed in many areas. Cotton prices had collapsed before the crop from this Province was ready for sale. The quality of the cotton produced in the Coast Province in 1937 was, however, good, even allowing for the fact that a fair amount of second-grade cotton was not sold owing to the lowness of prices.

WATTLE

Approximately 100,000 acres were under wattle at the end of 1937 in the Central Province and the acreage in the Embu, Machakos and Meru districts is still being increased. In the main bark producing districts of Fort Hall, Kiambu and South Nyeri the policy for the present is to maintain the acreage already planted and to concentrate on obtaining better returns per acre by instruction in proper methods of thinning and cultivation. Thinning campaigns were most successfully carried out in South Nyeri and Fort Hall and the natives in those districts now realize the value of thinning. In Kiambu the same progress has not been possible owing to the fact that there is a ready market for building poles, firewood and

charcoal; natives consequently regard the production of bark merely as a side-line. The quantity produced in the Central Province in 1937 was 16,025 tons of dry bark and 5,202 tons of green bark. The price of dry bark rose from Sh. 45/92 to Sh. 72/80 per ton at the factory.

In the Nyanza Province the planting of wattle was continued in most of the areas suitable for its cultivation. The total area which was, according to programme, to be planted in 1937 was not achieved, owing to lack of time and of the staff necessary for adequate supervision in the North Kavirondo, Nandi and Lumbwa wattle areas. In the South Tiriki location of the Central Kavirondo District it is estimated that 2,000 acres were planted and in the South Kavirondo District the effective acreage planted is estimated at 4,500 acres. Much time was spent on the care of the 1935 and 1936 plantations and much further care will be required until the growers themselves realize the importance of the after-care of wattle plantations. Thinnings are now much appreciated by many growers, especially in the denuded Kisii hills where building poles are much in demand. In the Nyanza Province the crop at present is primarily grown for its timber and the production of bark has not yet begun.

Maize

In 1937 in the Nyanza Province there was a considerable increase in the production of maize, rising prices early in the year having encouraged planting. The effect of past issues of improved seed, combined with the greater care in the selection of seed which was necessitated by the demands of central inspection, created a higher yielding strain in the maize producing areas. As the price actually obtained for the long rains crop was considerably higher than the 1936 price, the increased planting started early in the year was maintained and the short rains crop was extremely large. The change in the quality of maize has been, perhaps, the most outstanding feature of this type of agricultural development in this Province. In 1937 the Flat White strain superseded the Muratha strain in the maize exporting areas. Muratha is now only being encouraged in the dry lake-shore region, where the crop is mostly grown for local consumption. The decision to apportion the production of these varieties in this way arose from the results of a series of variety trials and it is likely to have far reaching results. Whilst the price of

maize was not unfavourable in any part of Kenya, it is believed that certain local influences played a large part in maintaining the high average price of Sh. 8/50 which ruled in Kisumu for the whole twelve months of the year. Firstly, there was the ability to export to overseas markets all maize which was surplus to local needs; secondly, there was the steadying influence of buying by the Kenya Farmers' Association; thirdly, there was an increase in the wealth of producers, which allowed them to dispose of their crop over a longer period than has been customary in the past; hence local prices were not influenced adversely.

MAIZE SALES ACCOUNTED FOR IN THE THREE KAVIRONDO DISTRICTS, EXCLUDING SALES TO GOLD MINES

1936		1937	
Bags	Value	Bags	Value
	£		£
156,970	42,810	246,767	91,026

In the Central Province the 1936/37 short rains were poor and the maize crop harvested in March in the main maize growing zones was accordingly light in yield. A considerable proportion of this crop from the high zone was consumed locally and it is not shown in the total quantity of maize sold from the reserves. Army worm did very considerable damage to the April planted crop throughout the lower zones of Fort Hall and Embu. Although planting was carried out as many as three times, approximately 75 per cent of that crop was lost and it is estimated that 10,000 acres of maize were destroyed through the ravages of this pest. In other parts of this Province the quantity of the long rains crop was over average in spite of lack of rain in July and August. Quality in established areas was excellent and in Meru and Kitui a marked improvement occurred.

The quantity of maize which passed through the inspection centres of the Central Province totalled 195,200 bags, that is 15,000 bags more than in 1936. In addition, large quantities of maize were sold direct to European estates for which counts are not available. In this Province Muratha is the chief variety grown.

In the Coast Province the variety Durum has been accepted as the most suitable for local conditions. It combines definite drought-resistance with a good yielding quality, and the maize itself, a yellow dent, was commented on very favourably at the Mombasa Agricultural Show. It is not yet grown exclusively, but arrangements have been made for its introduction everywhere. (See "Improvement of Crop Varieties.")

Oil Seeds

In the Nyanza Province there was a definite increase in the production of both groundnuts and sesame. In the South Kavirondo District the production of groundnuts increased from 2,121 tons in 1936 to 3,255 tons in 1937. In the Central and North Kavirondo districts the production of this crop is increasing annually. Earlier and closer planting of groundnuts and greater skill in the subsequent cultural treatment of this crop are gradually becoming more common. The stage has now been reached in the main producing areas, when the time taken to shell by hand and to select the crop for market, will not allow of much greater expansion. Market prices were less favourable than in 1936 and consequently producers tended to hold back their crop in the hope of price improvement.

Groundnuts—Total Production in Nyanza Province

1936		1937	
Tons	Value to Growers	Tons	Value to Growers
	£		£
2,620	23,330	3,755	38,478

Sesame is really only a catch crop in Nyanza Province, being sown late in the year and sold in February or March of the following year. Greater risks are taken climatically and often increased plantings produce no increase in cash returns. The oil-expressing plants in the Province have a steadying influence on the prices of both groundnuts and sesame. The price paid for 1936/37 sesame crop was higher than it should have been. There were fears for the success of the 1937/38 sesame crop at the planting season, but late rains helped and a large crop was harvested. Prices were:—

1936/37, Sh. 3/20 to Sh. 3/60 per frasila; 1937 crop, a reduction of about 80 cents per frasila in comparison with the 1936/37 prices.

In the Nyanza Province the yellow type of sesame is dominant.

In the Central Province oil seeds are not grown extensively.

In the Coast Province the black variety of sesame is grown, chiefly in the coastal area of Kilifi, for consumption in Mombasa. Despite the poor season good crops were obtained.

Beans

The main varieties grown are Rose Coco, Canadian Wonder (in the Central and Nyanza Provinces), Painted Lady and Boston Beans (in the Central Province only). There is also a large production of mixed types in both Provinces. Exports, which are confined to the varieties Rose Coco and Canadian Wonder, are mainly to South Africa. In the Central Province, as the result of inspection, the quality of all these varieties has been greatly improved and a ready market at good prices has been established. The actual quantity exported did not, hoewver, increase as greatly as was anticipated in spite of a greatly increased acreage. The consumption of beans by natives is increasing. In the Central Province the growing of Rose Coco beans is confined to Kiambu, South Nyeri, Fort Hall and parts of Embu; the growing of Canadian Wonder is confined to the Thika area; the growing of Boston beans is confined to Embu and Meru, and the growing of Painted Lady beans is confined to Machakos. This is done in order to avoid flooding the market with any particular variety. Boston and Painted Lady beans are still being bulked and are not yet produced in sufficient quantities for export.

In the Nyanza Province inspection has created a greatly improved type of mixed bean but its main object is the encouragement of the production of Rose Coco and Canadian Wonder as pure types. That object has not yet been achieved, although growers are gradually beginning to realize its importance. This policy has been helped by issues of improved seed.

Prices were better than in 1936, the average price being Sh. 10/80 (1937) as compared with Sh. 7/55 (1936) per bag of 200 lb. at Kisumu, and Sh. 9/90 (1937) as compared with Sh. 6/84 (1936) per bag of 200 lb. at Thika. The approximate value of beans sold through Kisumu was £4,894.

Other Legumes

Njahi (*Dolichos lablab*), pigeon peas, field peas, Victoria peas, gram and cowpeas are grown, mainly for local and coast markets. The recorded sales of green gram in Nyanza amounted to 313 tons, at an average price of Sh.3/33 per frasila (the price in 1936 was Sh. 2/23 per frasila) and the approximate value of the crop which was sold in 1937 was £3,231. In the Coast Province "New Era" cowpeas were issued. The "New Era" pigeon pea is being bulked and issued primarily in those areas where the restoration of soil fertility is essential. The question of the growing of marrowfat peas by natives was given consideration some three or four years ago but was rejected because of the skill and care required in the harvesting and drying of these peas, which are beyond the capacity of all except very few natives. Instead the native has been encouraged to grow the ordinary dried pea for the overseas market and introductions of improved varieties have been made, particularly of the Victoria Pea, which is a bold type with a good market. This has been rapidly multiplied and distributed to natives in the higher parts of Nyanza and Kikuyu. It is very popular with natives and it is expected that fairly large quantities will be available for export quite soon.

Rice

In the Coast Province the long rains crop both in the swamps and in the irrigated areas on the River Tana was severely damaged by continuous drying winds. At Vanga the failure of the river to rise led to a large reduction in the irrigated area and growers had to fall back on the rain-filled swamps for their rice land. The abnormal flooding of the upper reaches of the River Tana enabled good crops to be grown up-river. The short rains crop prospects at Vanga and in the irrigated Tana area, where this is the more important season, were good. The variety Peshawari is reported to have been completely successful on the River Tana and it is expected that it will be in general cultivation very shortly. Elsewhere, where conditions were unfavourable for rice, the early maturing qualities of Peshawari showed up well, and the quality of the grain is superior to that of any local type. This variety is sufficiently promising to justify the stimulation of its production in the rain-filled swamps of most of the rice-growing areas in this Province. Accordingly, an issue of seed of this variety was made in the short rains in the Vanga area and arrangements for more issues next season have been made.

In the Nyanza Province there was an increase in the area under cultivation and an improvement in the skill of growers. Originally, it was introduced as a famine prevention crop and native growers have subsequently responded very diversely to it, some having refused to have anything to do with it at all. Large stretches of lake-side swamp land, which had previously been used for rice growing, remained unplanted in 1937 because the water level of Lake Victoria rose $1\frac{3}{4}$ feet more than last year. The chief increase in the area under cultivation was in the inland swamps of the North and Central Kavirondo districts. A rice hulling mill was installed at Messrs. Rahim Jivraj's oil and cotton mill at Kibos. This mill produced up to fifty bags of first class household rice per day and will do much to ensure a satisfactory local market for surplus grain.

Quantity of Rice Sold in Nyanza Province

District	1935	1936	1937
	Tons	*Tons*	*Tons*
North Kavirondo	5	11	102
Central Kavirondo	41	166	409
Total ..	46	177	511

The area under the crop in 1937 was estimated at 690 acres and the cash paid to growers was approximately £2,861. The surplus crop will be sold in 1938.

In the Central Province this crop is still in the experimental stage, but a small area was planted by native growers in the Meru District.

Coffee

The growing of both arabica and robusta coffee in native areas is only allowed in gazetted localities which are selected for their suitability for the one type or the other.

Arabica Coffee.

Central Province.—Experimental plantings are still confined to Githungururu in the Embu District and Chogoria and Kaithi in the Meru District. At the end of the year there were fifty-four acres of this coffee. Plantations are very well cared for, all of them having been box-terraced and mulched. A small crop, harvested from the plantations at Githungururu and Kaithi, was consumed locally. Larger pickings were obtained in the Chogoria area and were processed at the Mission there.

Nyanza Province.—In this Province the early stage of introducing this crop to growers has now been passed. The necessity now is to select the most suitable applicants for licences and to confine them to the growing of a small area only. Arabica coffee growing is confined to the South Kavirondo District. The policy of "neighbourhood concentration" has been followed in suitable areas, the aim being to have each grower's coffee as near to his village as possible so that it may receive constant attention. At the same time, the siting of future pulping stations is not lost sight of. The area under the crop increased from fifty to seventy-eight acres and the number of growers from twenty-three to ninety-five. The first central pulping station was erected at Nyaribari and commenced work in August. In December, the first ton of parchment coffee was despatched to Nairobi for grading and sale. A high proportion of this first crop was classed on the borderline for the London market.

Robusta Coffee.

Central Province.—A comparatively small area, to the north-east of Meru, may be found to be suited to robusta coffee. Seedlings grown from selected "Nganda" seed were issued and 23.4 acres were planted by the end of the year. Growth so far is not very promising.

Nyanza Province.—In the plantations in this Province, the result of lack of top shade and wind-breaks is evident. As these are introduced, it is expected that the development of the plants will be considerably better. By the end of the year the area and number of planters were as under;—

Places	Planters	Area
		Acres
North Kavirondo	55	27½
Central Kavirondo	12	2
South Kavirondo	188	47
Total ..	255	76½

Tobacco

Central Province.

In 1936 arrangements were made with the British-American Tobacco Co., Ltd., for the investigation, in the Sagana area of the Central Province, of the possibility of

producing light cigarette tobacco leaf. Eight and a half acres were planted by native growers, under supervision, in October and November, 1936, and the buying of the green leaf produced by the British-American Tobacco Co., Ltd., commenced early in the year under review. 2,288 lb. of cured leaf, resulting from these native growers' crop, were produced and favourable reports on this leaf were received from London. Because of this success, the 1937 acreage was increased and, in all, 32½ acres were planted in November. Three additional barns and a grading shed were erected at Sagana in readiness for the handling of the larger crop which is expected to be harvested in 1938. In 1936 the four strains, White Stem Orinoco, Golden Dollar, Cash and Joyner were grown. The variety Joyner was a failure and was omitted in later plantings. As the tobacco crop produces large and quick returns it is popular amongst native growers. As much as Sh. 65 have been received from three-eighths of an acre. The prices paid for green leaf were:—

Extra good ...	...	4½ cents per lb.
First grade ...	...	4 cents per lb.
Second Grade	...	2 cents per lb.

Nyanza Province.

In the year under review the growing of this crop, which is fairly well established in the Butere area of the North Kavirondo District, was extended slightly in that area and also in Central Kavirondo, where, for the first time, it was grown in the Seme, Sagam and South Tiriki locations. The year was difficult climatically for tobacco growing and natives dislike it on account of the exacting work entailed in its production. Good maize prices also tended to curtail its expansion and hail was more severe than in any year since its introduction to the Province. On account of the partial failure of the main crop at Butere which is grown with the long rains a second crop was grown in the short rains and the leaf from that will be ready for sale early in 1938. Varietal and time of planting trials were started in Kisii. The variety used throughout by native growers was Western Dark Nyasa, and the leaf was all fire-cured.

A modern tobacco and cigarette factory was installed by Kenya Industries, Ltd., at their cotton ginnery at Ndere, Central Kavirondo District. This factory should do much to encourage tobacco growing in the Province.

Tobacco Sales in the Nyanza Province

District	1935	1936	1937
	Lb.	*Lb.*	*Lb.*
North Kavirondo	14,000	19,222	15,555
Central Kavirondo	—	Trials	3,640
South Kavirondo	—	—	Trials
Total ..	14,000	19,222	19,201

The amount paid to growers in 1937 was £254.

Potatoes

Potatoes are grown in appreciable quantities only in the Central Province, mainly in the Dagoretti division of the Kiambu District and in the South Nyeri District, at elevations over 6,000 feet. Inspection has considerably improved the quality of the product; known exports from South Nyeri rose from 5,000 bags in 1936 to 14,000 bags in 1937. Owing to unfavourable weather conditions and local consumption in the early part of the year, which was necessitated by a local scarcity of food, exports from the Kiambu District were less in 1937 than in 1936.

The varieties grown were Kerr's Pink in both main areas and British Queen in South Nyeri only. "Internal Brown Fleck" and Fusarium Wilt were present in both areas, necessitating great care at the time of inspection for export.

Even at prices at Sh. 3 or Sh. 4 for 180 lb. this crop provides the best return per acre of all crops grown; prices actually rose to as high as Sh. 7 per 180 lb.

Vegetables

In Nyanza Province, natives do not naturally take to the growing of vegetables, but the Local Native Councils have encouraged their culture by selling packets of seed of the main kinds at a cheap rate.

In the Central Province, the growing of vegetables is increasing throughout the higher areas, but the main producing area is the Dagoretti division of the Kiambu District. From that part, the sale of vegetables to Nairobi, Uganda and Tanganyika again increased, the value of the exports being in the neighbourhood of £6,000.

Through the efforts of the District Commissioner, vegetable growing in the Teita hills (Coast Province) continued to make good progress.

Cashew Nuts

The production of cashew nuts is confined to the Coast Province, but it is being tried in the Nyanza Province by a few growers on the gulf shore. The heavy short rains of 1936 on the coast caused damage to the crop at the flowering stage, which resulted in a high proportion of miniature and therefore valueless nuts in the first 1937 harvest. By the end of the year the total harvest was consequently appreciably less than in 1936. Towards the end of the year another flowering occurred which promised to produce a satisfactory mature crop.

Improved buying facilities, by which local selling was made possible even in areas in which only a few trees have come to maturity, have greatly increased the popularity of this crop. Large additional plantings were made in the last long rains; in spite of drought, their progress has been generally satisfactory. The main difficulties which were encountered in persuading native growers to cultivate this tree may now be regarded as having been overcome and it is expected that rapid extension of the cashew nut acreage will occur in the future. It will not be long, also, before the earlier plantings arrive at maturity, which will increase the saleable crop. Although heavy falls in the value of the product have occurred, it has been possible, so far, to maintain the same price as in past years. An adequate explanation of these falls is difficult; there does not appear to be over-production. The manufacturing firms are trying to find markets which are better than the American market as it is at the present time, and it is hoped that their effort will be successful.

Coco-nuts

Coco-nuts are only grown in the Coast Province. The possibility of improving the quality of copra is under review. In the meantime, instruction in better methods of drying is being given in the main Kilifi and Mombasa producing areas. The 1937 crop was good; copra from Lamu was of fair quality, but elsewhere was extremely poor. The coco-nut is still regarded mainly as a source of coco-nut wine.

IMPROVEMENT OF CROP VARIETIES (CHIEFLY FOOD CROPS)

The more important results are given under.

Lesser Millets.

Eleusine.—Seed of the "Bukura" strain, the standard of which is being maintained by selection, was issued to most of the late cotton areas of the Nyanza Province. The confidence of the native grower in this strain has now been won. The endeavour to isolate by selection a white strain, having all the good qualities of "Bukura" was maintained at Kisii. When perfected, this strain is intended for those parts of the South Kavirondo District where eleusine millet is grown as a cash crop.

Foxtail.—The strong awned strain of this millet which was selected at the Coast and which was referred to in last year's report, was re-selected but was not issued to growers on a large scale as successful issues of Dwarf Hegari sorghum were made and it was not desired to issue any other improved strain of food crop until that sorghum had become fully established. By concentrating on the one crop, a bigger effect can be made quickly; it is also thought that the popularity that is being earned by the sorghum will facilitate, at a later date, the issue of millets, which are at present unpopular with native growers in the Coast Province.

Bulrush.—Selections were made at Kakamega from an observation trial of five "Bajra" strains from the Punjab. The original seed produced a collection of mixed types. The 1937 selections will be tried in 1938. The Tanganyika strain of awned millet is now being grown in many parts of the Central Province. Although it is still rather a mixed type, it is much superior in yield to any of the local strains. Ear to row selections were made to try to fix the awned heavy yielding type and most satisfactory progress is recorded. Five Indian varieties and Pearl Millet—more recent introductions—are also under trial in Central Province.

White Persian.—In the Nyanza Province seed of this early maturing millet is still being recommended in the hope that it will be possible to induce native growers to grow it. It is of great value, owing to its very early maturity, in the drier areas of the Province, but the drawback to its cultivation is its high susceptibility to attack by birds. It is essential for the grower to protect it from birds. The type at

present being grown on the seed farms of this Province ripens very unevenly; selection to eliminate this character will be undertaken.

Sorghums.

In the Nyanza Province, the multiplication of seed of the two early maturing, dwarf and close-panicled strains "Dobbs" and "Kano" was continued and seed issues were made from all seed farms. These strains have not yet achieved the popularity of "Bukura" eleusine millet in this Province.

The sorghum is a most valuable crop in the drier areas of the Central Province. In 1937, a large number of strains, which had been introduced from other countries or other parts of Kenya, were tested in comparison with local strains. No definite recommendations can yet be made. Selection of the strains "Dobbs", "Katengu" and "Sunrise Kaffir", for resistance to powdery mildew, were made.

In the Coast Province, "Dwarf Hegari" is the most successful strain of sorghum. Issues of its seed were made in the drier parts of Kilifi. Multiplication of seed is still going on. Its early maturing character has made it popular, unlike most of the smaller cereals, with growers. It is noteworthy that it apparently resisted attack by stalk borer in the 1937 short rains. This pecularity will be investigated.

Beans.

The selection for resistance to bacterial blight of Rose Coco and Canadian Wonder beans was continued in the Nyanza Province and in the Central Province. In the Central Province similar work is being done with Boston and Painted Lady beans.

Selections of the Tepary bean are being made in the Coast Province, to produce a type more suited to the local conditions. Issues of seed of the unselected Tepary were made. In the lake shore areas of Nyanza Province, where this early, drought-resisting variety of bean should be valuable, native growers have so far refused to become interested.

Groundnuts.

A trial of introduced types in comparison with local types was begun at Kibos, in Central Kavirondo. So far, no type, which is better than the local types, has been discovered. The results obtained at Kibarani in 1937 on wilt

resistant strains were promising; the work proposed in 1938 should show whether a truly wilt-resistant strain has been found or not.

Rice.

The type which used to be known in Nyanza Province as "Mumias" is now known to be a mixture of the varieties "Bungala", "Sindano" and "Mbuyu". It is now in that Province almost all grown as one or other of these pure strains, of which "Bungala" fetches the highest price. "Peshawari" continued to prove itself to be a most satisfactory variety in the coastal rice-growing areas.

Cassava.

In the Central and Coast Provinces trials of several varieties of cassava were made in order to discover that variety which was most resistant to Mosaic disease. In the Central Province the "Malindi" and "Seychelles" varieties proved more resistant to Mosaic than any of the local varieties and large issues of planting material of the "Seychelles" and "Malindi" varieties were made in Kitui. Multiplication especially of the "Malindi" type was done in all the lower areas of the Province. Seven varieties from Amani were under trial at Kitui.

In the Coast Province multiplication and issue of planting material of the "Malindi" variety was done throughout the year. The policy in this Province is to establish multiplication plots of this variety in all localities, from which rapid extension to native cultivators can easily be carried out. Plots were established in the dry areas of Kilifi and Malindi and at Kwale, Tiwi and Digo. Planting material was also sent to Voi and Mombasa and arrangements for the establishment of multiplication plots at Lamu, on the Tana River and at Garissa were nearing completion at the end of the year.

Pigeon Pea.

In the Nyanza Province, this crop is not a popular one with the native grower, but, for the few growers who had been induced to try it, seed of an early Pusa strain was multiplied. Several other varieties were under trial at Maseno. In the Coast Province the New Era variety was multiplied steadily and from time to time was issued, mostly in those areas where restoration of soil fertility is of special importance.

Cotton.

Cotton variety trials were continued in the three main agricultural Provinces in order to obtain strains suited to local conditions. In the Nyanza Province no conclusive recommendations are yet possible. In the Coast Province strains Nos. 998 and 9243 are being multiplied for issue eventually.

Victoria Peas.

In the Nyanza Province seed of this pea was multiplied on all seed farms and by native growers. Its cultivation was encouraged, especially in the colder areas, and good samples of dried peas were obtained from those areas. So far, the native grower has looked on peas as a green vegetable only and not as an exportable crop.

Maize.

From variety trials in the Nyanza Province, in which the Muratha strain was used as the control, it was found that a Kitale flat white type would suit the maize exporting districts of the Province best. Accordingly seed of that type was obtained and was issued to all seed farms for multiplication in the long rains. The first issue of it from seed farms was made to native growers in the short rains.

In the Coast Province the variety Durum has been accepted as the most suitable variety for local conditions. It combines definite drought-resisting with good yielding qualities and the grain itself, a yellow dent was commented on very favourably at the Mombasa Show. The introduction of one particular variety can only be accomplished successfully and completely if sufficient seed can be issued in a selected area to ensure the complete elimination of all other types in that area. Hitherto the poverty of Local Native Councils on the Coast has made such large-scale methods impracticable, but with the restoration of their finances it has been possible to make arrangements which should, in the future, result in the complete introduction of Durum maize. By a comparatively heavy outlay for two or three years it is hoped to establish this variety thoroughly and then work will be concerned mainly with its maintenance and its improvement.

Seed Farms

The seed farms continued to play an important part in the Department's work in the three agricultural Provinces. As stated in the 1936 report, these farms are supported

financially by Local Native Councils. Omitting the small bulking plots, the numbers and acreages of these farms were, in 1937, as follows:—

Province	Number	Total Acreage	Acreage under Cultivation
(*a*) Nyanza	4	718	344
(*b*) Coast	3	360	294
(*c*) Central	12	408	302

The acreage under cultivation includes experiments, pasture, trees planted and fallows.

(*a*) This includes the Bukura training centre and farm supported by funds from the Department.

(*b*) This includes the experiment station at Kibarani, which is also supported primarily by Department funds and an area of 30 acres lent for a period of twenty years by Mr. W. G. Lillywhite for the benefit of the people in the Kilifi District.

(*c*) This does not include the acreage at the Scott Agricultural Laboratories where Agricultural Instructors are trained.

The main object of these farms is the production and bulking seed of improved strains and varieties of useful crops for issue to natives. Demonstrations to natives of agricultural practices are made at these centres and a certain amount of selection and investigational work is carried out. On all farms proper soil conservation methods have been introduced, especially those which are suited to native land and it is now the policy to provide demonstrations of mixed farming principles. Soil fertility is maintained by the production and application of compost and by giving each field a resting period under Napier grass, Black Mauritius beans and other crops suitable for this purpose for the native cultivator. The development of small holdings continues. The use of windbreaks is demonstrated on farms situated in areas where they are necessary. Oxen are kept on all farms and all waste products of the farm together with, for instance, Napier grass trash is passed through the cattle sheds for the making of manure and compost. Most of these farms have now an adequate number of tools and implements.

The farm at Kilifi was started in 1937 in order to allow the station at Kibarani to be used entirely for investigational work and preliminary seed multiplication for the whole of the Coast Province.

	Nyanza Province	Central Province	Coast Province
	Bags of 200 lb.	*Bags of 200 lb.*	*Bags of 200 lb.*
From L.N.C. Seed Farms and Funds			
Maize	100	1,028	29
Sorghum	26	37	34
Eleusine millet	28	—	—
Groundnuts	146	—	—
Beans	82	238	—
Rice	34	—	20
Wheat	1	5	—
Rye	—	—	—
Simsim	5	3	—
Awned Bulrush Millet	—	145	—
Foxtail Millet	—	—	—
Victoria Peas	18	48	—
Cowpeas	—	29	—
Gram	—	2	—
Tepary Beans	1	—	8
Potatoes	—	389	—
Pigeon Peas	1	—	—
	Tons	*Tons*	*Tons*
Napier Grass	30	400	—
Cassava	—	35	—
From Agricultural Department Funds	*200 lb.*	*200 lb.*	*200 lb.*
Maize	8	22	21
Sorghum	45	—	—
Eleusine millet	14	—	13
Groundnuts	25	—	—
Cowpeas	—	—	4½
Pigeon peas	—	—	4
Foxtail Millets	—	—	10
Rice	—	—	10
Potatoes	—	50	—
Boston beans	—	6	—
Canadian Wonder Beans	—	½	—

Agricultural Education of Africans

Training of Instructors and Others

Africans are trained at two training centres, namely, Bukura, North Kavirondo, in the Nyanza Province, and the Scott Agricultural Laboratories, Kabete, in the Central Province. Kenya is divided by an imaginary line running north and south through Nakuru for the purposes of training.

Apprentices from agricultural tribes living to the west of this line are trained at Bukura and apprentices from agricultural tribes living to the east of this line are trained at the Scott Agricultural Laboratories, with the exception of some Coast natives who are trained at Kibarani. The schools at Bukura and the Scott Agricultural Laboratories do not recruit at the present time their apprentices only from the Nyanza and Central Provinces respectively, but recruit also from agricultural tribes outside those Provinces.

It is intended that African apprentices who have passed the Primary School Examination before entry to one of the Department's two main training centres shall be indentured for a two years' course of training; but that those who have not passed that examination before entry shall do a three years' course of training in agriculture and shall receive additional schooling to enable them to pass the Primary School Examination at some time in the period of their training. The aim is to recruit a more highly educated type. Owing to the difficulty at present in recruiting Africans who have passed the Primary School Examination, it has not yet been possible to introduce these two distinct courses, but it is hoped that it may be feasible to do so in 1938. In 1937, as in past years all apprentices were indentured for a three years' course whether they had passed the Primary School Examination before entry or not; those who had not passed that examination were given the opportunity of preparing themselves for it and of taking it during the course of agricultural training. All apprentices who complete their course satisfactorily should be well fitted to become peasant farmers. Agricultural Instructors paid by the Department or by Local Native Councils are recruited from these apprentices; others become teachers of agriculture in Mission or Government schools or return to their homes and farm on the lines which they have been taught.

Agricultural Education at Elementary Schools in the Native Reserves

In 1937, a greater degree of control of agricultural teaching at Elementary schools aimed at standardization of the teaching of approved subjects was established.

Pupil Labourers on Seed Farms

Africans of a less educated type than that which is thought to be suitable for training as instructors and teachers were given a six months' course in practical elementary agriculture at the Kakamega Seed Farm in Nyanza Province, the

idea being that, after their course, they would return to their land better equipped to farm it properly. It is hoped to of all apprentices in training in 1937 at Bukura is given under.

Nyanza Province

Training of Instructors and others.—A tribal analysis of all apprentices in training in 1937 at Bukura is given under.

Tribe	Left December 1937	Leaving December 1938	Entered January 1937	Total at beginning of year
N. Kavirondo (Bantu)	3	7	6	16
C. Kavirondo (Luo)	..	4	6	10
C. Kavirondo (Bantu)	..	..	..	..
S. Kavirondo (Bantu)	1	2	2	5
S. Kavirondo (Luo)	..	2	4	6
Kamasia	..	..	..	..
Suk	..	1	..	1
Elgeyo	..	..	2	2
Marakwet	..	1	..	1
Nandi	..	1	..	1
Kipsigis	..	..	1	1
Total	4	18	21	43
Total of Agricultural tribes	4	15	18	37
Total of Pastoral tribes	..	3	3	6

In the past a senior apprentice was in charge of the small-holding which is attached to the farm. In 1937 two other small-holdings were started and it was possible, with three holdings running simultaneously, for apprentices regularly to perform part of the routine duties on these holdings. In this way, it is hoped to teach them to apply the substance of their new agricultural knowledge to a type of husbandry which is more like that practised in the reserves, but with judicious improvements. Part of the instruction at Bukura covers animal husbandry, but so far it has been impossible to combine it with much practical instruction because there are not enough cows on the station. Apprentices are also seconded for duty under working instructors in the reserve in order that they may learn to apply their knowledge in the field.

Farm pupils.—As mentioned above, on the Kakamega Seed Farm pupil labourers are engaged for periods of six months for training in simple agricultural practice with the

object of returning them to their homes equipped with sufficient knowledge to make them better farmers. Selected natives from most of the locations in North Kavirondo in turn are taken on.

Agricultural Education at Elementary Schools.—Each sector (elementary Mission) school now has an agricultural record book in which the plan of work for the year is set down by the Agricultural Officer of the district. A map of the fields is made, a rotation is laid down and instructions are given for the record each season of crops and of field treatments. Agricultural Instructors have to visit these schools at regular intervals and help the teachers to carry out the scheme laid down. With certain exceptions, the work in school fields is still of a poor standard, but when the new system detailed above has had time to become effective it is hoped that better results will be achieved. It should be noted that the old, small school gardens, of which there was one for each boy, have been dropped and that now all schools have small school fields, much larger than the gardens, worked by all the boys together.

Central Province

Training of Instructors and others.—The attractions of other employment impeded the recruitment of Post Primary apprentices at the Scott Agricultural Laboratories training centre. In comparison with the previous years, more stress was laid in the curriculum on practical work and on soil conservation and animal husbandry. Apprentices in their final year had the opportunity of spending, on three occasions, a week on the small-holding which is attached to the school and they were thus able to acquire a practical knowledge of animal husbandry, poultry, ghee-making, etc. Nineteen vacancies for apprentices in January were filled, seventeen recruits coming from the Central Province and two from the Coast Province. Of the total number, seven had passed their Primary School Examination before entry.

Agricultural Education at Elementary Schools.—District Education Boards have been formed in South Nyeri, Embu, Fort Hall and Kiambu districts. Each Board employs one or more instructors in agriculture who work under the supervision of the district Agricultural Officer. These instructors visit elementary schools and advise teachers on the management of school gardens. They also give short talks to the school pupils.

Coast Province

Training of Instructors and others. — In this Province a proper school for the training of native agricultural instructors does not exist, but selected apprentices are given what is essentially a practical agricultural training at the Coast Experiment Station. In 1937 twenty-two apprentices were in residence at Kibarani. Of these, two completed their three years' course and were taken on the staff at Kibarani in place of older instructors. At the end of the year, eight had completed two years and twelve had completed one year of their training. The standard of education required for more recent entrants has been raised, but, as in the case of entrants to the two main training centres, it will not be possible for some time to insist on entrants having passed the Primary School Examination at their elementary schools. The improvement in the mental capacity of apprentices is very noticeable, and from now on the training given at this centre should achieve a steady improvement in the quality of the native staff of the Department in the Coast Province. The teaching side at Kibarani has been improved by the appointment of a qualified native teacher.

Investigational Work

Coast Province

Considerable progress has been made in developing the Coast Experiment Station at Kibarani, where investigational work in the Coast Province is mainly done, on the lines indicated by Mr. Milligan, of the Empire Cotton Growing Association, in his "Cotton Inspection Note" (page 21), and published in the last annual report.

At the beginning of 1937 the station was better equipped for the work it has to do than at any other time. Of the 300 acres of land available, about 170 acres had been cleared and stumped, the general layout of the area had been completed and, of the greatest importance, it had been possible to acquire a tractor with plough and harrow, without which work was seriously handicapped. The main experimental area now consists of two large blocks. The first of these lies on the western boundary of the station and has been divided up into a number of ranges, separated by belts of cashew nuts. Main plots have been demarcated by permanent concrete pegs. An adequate period under a resting crop, which is needed for much of this land, will be possible in 1938 when the new block will be ready for use. The

second block is on the southern boundary of the 170 acres and is at present under a cover crop for the purpose of levelling up some of its soil variation. Cashew nut belts have been planted and it will be divided into ranges and plots early in 1938.

Towards the end of the year another eighty acres were cleared to provide an additional area for experiments. In the main bulking area only some twenty acres were put under crop, the remainder resting under pigeon peas and Mauritius beans. Five acres were under cotton and the rest under cereals and legumes. The development of the Kilifi Local Native Council farm on land generously given them by Mr. Lillywhite is now making it possible for this station to link its bulking programme more closely to the experimental work. This is essential as it is necessary to bulk the new cotton strains under supervision at the station and this work with suitable rotation arrangements will require as much land as it is possible to devote to it. The tree nursery, which has been hitherto of necessity of a rather temporary nature, is being improved. Steps have been taken to put it on a permanent basis and this should be completed early next year. Bamboos have been established after some difficulty and are to be extended with the object of using them to replace the present unsatisfactory shades of coco-nut palm leaves. No further permanent buildings have been erected yet. The camp still consists of wattle and daub structures, which are unsatisfactory and expensive to keep in good repair. Water supplies, however, have been improved by two small wells, which in average seasons should give a good supply during the greater part of the year. The work of the station has been carried out partly by ordinary labour and partly by native apprentices, who are undergoing training here. (See section deailng with education.)

Climatic conditions were extremely difficult. Early rain fell in April, which permitted of early planting of all the maize experiments. The main rains broke at the end of that month but instead of continuing steadily were mostly over by the 10th May. From then on the season was mainly dry, though sufficient rain fell towards the end of June to allow quick maturing crops to be sown. Throughout the season conditions were made worse by continual strong, drying winds. Towards the end of the year the drought was broken by the short rains, which were the best since 1930, a difficult year, closely resembling the present one.

As in previous years the work of the station fell roughly under four main heads, which, however, naturally overlap.

1. Soil fertility.
2. Food crops, with special reference to drought-resisting varieties.
3. Cash crops.
4. Trials of new plant introductions.

Of results obtained the undermentioned are noteworthy.

(i) Sufficient information on conservation of soil fertility has been collected to make it possible to introduce a rotation of crops, which promises to be of great value, though modifications may prove desirable at a later date as the work proceeds.

(ii) A variety of maize from Australia, named Durum, appears particularly suited to coastal conditions and should prove satisfactory as a basis for further experimentation.

(iii) A variety of cassava, named Malindi, found by the Agricultural Officer in charge of the Coast Province, is strongly resistant to mosaic disease and has given good results both at the Coast and in other areas to which it has been sent.

(iv) Improved varieties of leguminous crops are now being multiplied and issued.

(v) An American variety of Sorghum, named Dwarf Hegari, is very quick to mature and yields well.

Soil Fertility Experiments.

The series of experiments on conserving soil fertility were continued and notes are given below. This work is of the greatest importance and is already giving useful information.

Green Manure Experiment.—This experiment was carried out in 1936 with inconclusive results. It was repeated on the same plots as last year and with the same treatments.

Treatment A—Cowpeas: turned in green at time of flowering.

Treatment B—Cowpeas: cropped and plants turned in.

Treatment C—Cowpeas: cropped, plants burned and ashes turned in.

Treatment D—Foxtail millet.

Treatment E—Green fallow.

The differences in yield were again insignificant. It may be noted, however, that in both years the yields of maize after foxtail millet were the highest and after fallow the lowest.

It is considered that it has been clearly shown that a quick green manure, however treated, is of no value in restoring soil fertility under these conditions.

Soil Renovation Experiment.—This experiment was laid down in 1936 as a 4×4 Latin square, to investigate the relative value of—

(i) grass fallow;
(ii) pigeon peas;
(iii) Napier grass;
(iv) Mauritius beans,

in restoring fertility to worn out land. In the present year the debris from these crops was turned in under ridges and a maize crop was planted. The resultant maize yields are tabulated below:—

Size of Plots—1/20 Acre
Yields of Shelled Maize in ¼ lb.

	Pigeon Pea	Mauritius Bean	Napier Grass	Fallow
	430	175	237	117
	317	265	234	206
	377	349	325	218
	389	297	268	275
Means	378·25	271·5	266	204

The experiment proved to be highly significant. Pigeon pea is significantly better than any other treatment; Mauritius beans and Napier grass were significantly better than fallow. A further crop of maize was planted in the short rains to test the residual effect.

It is concluded that long season crops used for soil renovation give a result after one year. Napier grass suffered owing to its excessive bulk of material and it is probable that it would be better to burn off some of this excess. It is uncertain, however, how lasting this effect will be and it is probable that under Coast conditions one year is insufficient. In trial rotations it is proposed to keep pigeon pea in for at least two years and, in the absence of manure, possible three. It is proposed, therefore, to extend the experiment next year, as under.

(*a*) The present experiment will be continued until results are insignificant.

(*b*) A randomized block experiment with the same treatments has been laid down this year and it is proposed to let this run next year and plant it with maize in 1939.

(*c*) Two further random blocks will be laid down with the same treatments. One will be cropped in 1939 and one in 1940.

In this way the present year's experiment will be repeated and information on the relative merits of one or two years under the resting crop will be obtained. In the meantime, the behaviour of pigeon pea is most encouraging for the reason that it is also a food crop and is, therefore, more likely to be easily introduced into native practice than alternative measures.

Rotation Experiments.—The experiments started in 1936 and reported in the last Annual Report, were continued this year. At this stage there is nothing to report.

Coco-nut Experiment.—It was noted in 1936 that coconuts, when grown with Mauritius beans as green cover, continued to show a healthier state of the palms as compared with control plots without this green cover. This trial was continued in 1937. It is still too early to make a full report, but it appeared that the plots under Mauritius beans failed to maintain their superiority over the controls.

Crop Trials.

Cotton.—The experimental work on cotton was considerably enlarged in 1937 and a further extension will be necessary next year, when the programme of work will be in full operation. The main feature of Coast conditions is that the long rains may finish much earlier than they should and a long dry period ensue. A cotton variety really suited to the Coast must be able in such cases to set and hold its crop. On the other hand there is no reason to think that it is necessary to go to the extreme of growing very short staple cotton; there are plenty of indications that amongst the derivatives of U. 4 it will be possible to obtain a variety suitable to our conditions. With this end in view a number of Barberton

varieties were introduced and single plant selections amongst these began in 1936, when over 300 were made. These were sown in the present year. Many were discarded because of excessive liability to attach by "jassid", low ginning percentage and low yield. The remaining selections are being examined in the laboratory and the best selections will be grown on next year. More single plant selections were made in 1937 and will be sown next season. Seeds of a number of strains from Southern Rhodesia were obtained. These will be planted in 1938 and should provide a wider basis on which to carry out future selection work. Seed of S.P. 20 from Uganda and of four wilt-resistant varieties from America was received in 1937 but it was too late for it to do well in a very difficult season. Adequate material for further trial, however, was harvested. This work cannot be expected to give results for some time and it is felt that if one of the present strains could be shown to be generally suitable for our conditions, immediate steps should be taken to replace the variety at present in cultivation.

In 1935 the most promising varieties were 920, 9243, 998 and 955. In 1936, 920 failed to maintain its pre-eminence; 9243 and 998 yielded the best, but 998 had the better ginning percentage. 955 did well, but its greatest point of interest was its earliness. In the present year, special and ordinary bulks of all the U/4 derivatives on trial were sown at Kibarani. In addition a number of observational plots in the districts were planted with the most promising of these and with the variety N. 17, which is generally in cultivation. The result of these trials has shown that 9243 is the most promising of the introductions, that 998 and 920 only did moderately well and that 955, in spite of its earliness, was apparently insufficiently hardy for the very difficult conditions prevailing this year.

An experiment to study the question of whether it was desirable to mix cotton and maize was laid down. The object in view is to find out the best method of growing these crops from the native point of view. The implications of the result have not been fully studied yet but it appears clear that mixing has a very adverse effect on the cotton crop if the maize is planted at such a spacing as to give a satisfactory yield. It seems probable that under native conditions, maize is naturally planted wide enough to lessen this adverse effect. This suggests that by separate planting with suitable spacing a good cotton crop should be obtainable without any serious

reduction of present maize yields in native fields. The importance of this is obvious and further study of the problem promises to be of great value.

The main lines of work are now well advanced and the whole cotton experimental programme is now on a satisfactory basis. As noted above a further extension of work is proposed for Kibarani next year and it is also hoped to replace the present district observation plots by a standard statistical lay-out. It is considered that progress is now sufficient to justify this further development.

Cassava Variety Trial. — An observational variety trial of cassava was carried out during the season. The object was to compare the mosaic resistance and other qualities of a number of seedlings from the resistant variety, Malindi, with the same qualities of a number of varieties received from Amani in 1936. The seedlings had been raised in 1936. Thirteen were selected as the most promising that year. Single rows of cuttings of apparently clean material were planted of all varieties and sufficient rows of the highly susceptible variety Binti Athman were planted so that every variety under trial was next to a row of Binti Athman. The experiment was laid down on the 21st April with ten cuttings in each row, planted $6' \times 3'$ on ridges. A specimen root was harvested from each row on 23rd November, the remainder being left to provide planting material next year. Conditions appear to have been very favourable for the experiment as the variety Binti Athman was more severely affected by the disease than has previously been noted at the Coast. Generally this variety is highly infected but makes good growth and gives a fair yield in spite of it. In the present season it was heavily stunted and only towards the end of the year did it appear to be making good growth. Observations for signs of mosaic were made at intervals during the season. As had been hoped, considerable variation appeared in the Malindi seedlings, though most of them retained the characteristic open growth of this variety. Several promising types, apparently resistant, emerged. Of the Amani varieties a few remained free throughout the season but the majority showed the characteristic signs of mosaic infection. Tests of palatability were also made because for Coast purposes a variety at least as sweet as the variety Malindi is essential. Notes on the varieties are given below.

Amani Varieties

****Calabar.*—Attractive, moderate growth free from disease. Quality, very good.

***Serero.*—Vigorous bushy type. Signs of mosaic at one stage. Quality, good.

***Ankrah.*—Strong, rather coarse growth. Signs of mosaic at one stage. Quality, very poor.

***Kru.*—Strong, rather coarse growth. Signs of disease at one stage. Quality, very good.

***Mama l'enfant.*—Vigorous type, slight signs of mosaic. Quality, very poor.

Sellier.—Severely stunted by mosaic. Quality, poor.

Turkey Claw.—Most of the season half the plants remained clean and the remainder were severely stunted. In November mosaic was generally present. Quality, poor.

****Parasol.*—Strong, attractive growth free from disease. Quality good but tubers coarse and fibrous.

Black stick.—Very badly stunted by mosaic.

White stick.—Mosaic present throughout; two plants severely stunted. Quality very good.

Jamaica No. 2.—Mosaic present throughout and plants stunted. Quality, very fair.

Jamaica No. 3.—As above. Quality, very poor.

Jamaica No. 4.—As above. Quality, very fair.

Jamaica No. 5.—As above. Quality, very fair.

Malindi Seedlings

****M.* 1.—Very strong, erect, compact growth. Free from disease. Quality, very good.

M. 2.—Erect, open type. Signs of mosaic at one stage. Quality, fair.

****M.* 3.—Medium, bushy type. Free from disease. Quality, very poor.

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*Amani varieties, which showed signs of disease at one stage but grew well and produced satisfactory tubers.

**Varieties showing no signs of disease, which may be highly resistant.

M. 4.—Strong, erect type but some signs of mosaic. Quality, very fair.

***M.* 5.—Attractive, moderate growth. Free from disease. Quality, very good, but tubers fibrous.

***M.* 6.—An outstandingly attractive seedling. Very strong. Habit similar to Malindi but more vigorous. Free from disease. Quality, very good.

***M.* 7.—Moderate growth, free from disease. Quality, very good.

M. 8.—Heavily infected but growing away in November. Had failed to form a useful tuber on the specimen plant lifted.

***M.* 9.—Moderate growth, free from disease. Quality, very good.

M. 10.—Strong grower; slight signs of mosaic were suspected at the second observation and it remained suspicious throughout the season, never becoming sufficiently marked to ensure certainty. Quality, poor.

M. 11.—Good growth but slight signs of mosaic. Quality, very poor.

***M.* 12.—Attractive type, free from disease. Quality very good.

***M.* 13.—Strong growth, free from disease. Quality, poor and tubers very fibrous.

N.B.—The specimen roots were weighed as a matter of interest but no figures are given as comparisons on single roots would be impossible.

The conclusions arrived at are:—

1. *Amani Varieties.*—It is proposed to discard all varieties without an asterisk and all with poor eating qualities. Planting material of the variety Calabar will be increased with a view to its inclusion in a randomized block variety trial later; the others will remain under observation.

2. *Malindi Varieties.*—It is proposed to retain only those with two asterisks which are of good quality, i.e. M. 1; M. 6; M. 7; M. 9; M. 12. These will be increased under observation with a view to the inclusion of the best of them

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**Varieties showing no signs of disease, which may be highly resistant.

in a variety trial, in which Malindi will be the control variety. In the meantime a statistical trial of Malindi and M. 6 has been planted, in view of the marked attractiveness of this new seedling.

Several other new seedlings are available for trial next year.

Maize Selection.—Routine bulk selection of Durum maize was carried out. Single plant selections were also made. In view of the fact that the original importation consisted of only two cobs, it was felt desirable to obtain further material from Australia, and towards the end of the year two bags of fresh seed were received.

Sorghum Variety Trial.—The variety "Dwarf Hegari" was chosen as the most suitable for Coast conditions. During the year further rogueing was done; the variety is now pure. It is proposed to begin selection for yield without loss of early maturity, which is an extremely valuable character of this sorghum.

Foxtail Millet.—Work on selection of a heavy yielding awned type was continued. Conditions were difficult owing to the drought, but a number of strains did moderately well and further selections were made. Bulk selection was continued as routine practice.

Rice.—The good results obtained previously with the variety Peshawari were confirmed by 1937 trials, which were carried out on the Tana and in Kilifi and Digo Districts. The season in the rain-filled swamp areas was a bad one for rice, much damage being caused by the continual strong winds. Nevertheless, Peshawari proved to be more quickly maturing than other varieties and the quality of the grain is superior to local types. Large-scale issues have accordingly been planned in Kilifi and Digo Districts in 1938.

At Kau trials of new varieties were continued by the Agricultural Assistant. None of the new varieties yet tried approaches Peshawari in early maturing qualities. Most are medium season and consequently of limited value under coast conditions. Of these, Sindano and Mwanza Sena are considered the most promising. The long season Afaa does well and appears to be very similar to the variety Ambarikori, which is the chief variety at present grown in the irrigated area. Short season varieties from Australia failed to germinate, probably owing to the seed being old. Further seed

was obtained towards the end of the year and is under trial at Kwale; germination was moderately satisfactory.

Miscellaneous Pulses. — Trials of mung and black gram from India failed. The mung varieties failed to germinate, whilst the black grams grew moderately well but failed to give a crop. Selection of Tepary beans was continued. The objects aimed at were to isolate a spreading type and if possible obtain a strain which can stand moderate rain at any stage in the growing season. Originally, the bulk of the crop consisted of bunch types, which even at close spacing failed to form an effective cover which was considered a bad defect. Rain late in the growing period was apt to cause a partial or almost complete loss of crop. As rain may occur at any time on the Coast, this is a serious drawback to a crop which should be of the greatest value. Considerable success appears to have been achieved to date, judging from results during the short rains, which have been unusually heavy and prolonged. By close spacing of the creeping type, an excellent cover has been produced, which at the time of writing appears to be carrying a heavy crop and has been little affected by the heavy rains. Further work will be necessary to confirm this and selections are now being made.

Another important pulse that is receiving attention is Fiwi or Njahi (*Dolichos lablab*). In past years a large number of imported varieties were tried, but without success. All made a heavy cover but failed to produce a crop. Seed of the local variety was collected and planted in 1937 and the possibilities of improving this by selection are being investigated.

Cowpeas.—After variety trials over a number of years, a variety "New Era" has been chosen for issue. It yields well and matures more quickly than the local varieties. The possibility of improving this variety by selection is under consideration.

Pigeon Pea.—In view of results being obtained from the soil fertility experiments, this crop is regarded as of the greatest importance to the Coast. The variety "New Era" has proved superior to any other variety tried, but it is considered that selection for yield would be extremely useful and such work is now in progress. No result will be available for some time.

Wilt Disease of Groundnuts.

A sharp setback to hopes was administered in 1936 when wilt was serious again, even in the best selected strains of 1935. Consideration of these results led to the modification of the design of the experiment in 1937. It seemed desirable to afford some protection from wind and to adopt very much closer spacing. The possibility of mulching was also considered. Accordingly, rows of maize were planted across the lines of the single plant selections, which were spaced more closely. A series of small bulks from the best strains were planted and half of each of these plots was mulched with Napier grass. Germination was on the whole good but owing to the dry conditions second sowings to fill blanks were failures. The strong winds and dry weather were extremely unfavourable to the crop and wilt appeared early, on 21st June. Later, other losses occurred due to drought and in some cases it became difficult to decide the cause of death, as the usual characteristics of the wilt were not always present. Only strong growing strains were able to withstand the adverse seasonal conditions. Strains from 28, an original selection, were specially noticeable for their vigour and comparatively high resistance. They form an encouraging group for further work. In the bulks it was observed that the mulched plots were consistently more affected by wilt than the unmulched plots. Yields were low, those of the mulched plots being lower than the corresponding unmulched ones. Although yields between strains are not strictly comparable, it may be noted that the best plot, consisting of strain 554, yielded at the rate of 529 lb. per acre on the unmulched plot and 340 lb. per acre on the mulched. It should be remembered that seasonal conditions[6] were extremely difficult and it was to be expected that yields would be poor. In these circumstances the yield of this strain on the unmulched plot may be considered promising. At the end of the season some ninety-four single plant selections were made, mostly in the 28 group. The remaining plants of each strain were harvested as small bulks.

Although no strains came through entirely free from wilt, considering the unfavourable season the results are encouraging and plenty of good material for further work is available.

Miscellaneous Crops.

Trials of other crops included sesame, oil palms, kapok and derris.

Central Province

This Province has no real experiment station; investigational work has, therefore, to be carried out when time permits on the Seed Farms and at separate plots.

Cotton

Cotton is a new crop to the Province and its cultivation is fraught with difficulty. The greatest obstacles to cotton growing are, firstly, the cold, dull weather of July and August and, secondly, stainer infestation. It was decided to carry out all cotton investigational work for the Kikuyu districts in Embu and in pursuance of this policy suitably situated trial plots of five acres each were established at Mberre and Ndia. Seed of numerous types of cotton is to be imported for trial from South Africa and all East African countries. The object of trials is to discover types which are very quick maturing and which may therefore be planted in the short rains and which will provide a harvest before the cold, dull spell and, secondly, very slow maturing types which will not fruit to any extent until after the cold, dull spell.

Variety and Spacing Trials.—These trials were made in five separate plots situated in the Machakos and Kitui Districts. The varieties were U/4/4/2; N. 17; Barberton 052 and Barberton 998. The spacings were $3' \times 1'$; $3' \times 1\frac{1}{2}'$; $3' \times 2'$. Each variety and each spacing was replicated four times.

In the higher areas $3' \times 2'$ spacing gave the best yield with all varieties except N. 17. In the lower areas $3' \times 1'$ spacing gave the best yield with all varieties except N. 17. There was no observable difference in the degree of drought-resistance shown by any of the four types under trial, but under more normal climatic conditions it is thought that Barberton type 998 would prove superior. The types U/4/4/2 and Barberton 998 were consistently the best average yielders. These trials have been repeated in the 1937/38 season.

Grass Mulch in Cotton. — Cotton was planted in November, 1936, on a plot in the Kitui District and a grass mulch was laid down early in January, 1937. Up to the commencement of the April rains the mulched plot showed more severe drought, apparently owing to the reflection of heat from the light-coloured grass mulch. After the rains the position was reversed and the mulched cotton showed better growth and practically no droughting.

Variety Trial (*Kitui and Machakos*).—Eighteen varieties of cotton received from Uganda, Southern Rhodesia, Nyasaland and Tanganyika were sown in November, 1937. No results are yet available, but it is hoped that one of these varieties will show some degree of resistance to boll-shedding and the effects of the cold, dull spell.

Cotton Spacing and Interplanting Trial (*Fort Hall and Meru*).—This experiment was designed to discover the returns which are obtainable when cotton is interplanted with beans at various spacings and to compare these returns with those of cotton sown without any interplanted crop. The spacings adopted and the methods of interplanting are shown below.

(*a*) Cotton planted $2' \times 1'$ with no interplanted crop.

(*b*) Cotton planted $3' \times 1'$ with one row of beans interplanted.

(*c*) Cotton planted $4' \times 1'$ with one row of beans interplanted.

(*d*) Cotton planted $5' \times 1'$ with one row of beans interplanted.

(*e*) Cotton planted $3' \times 2'$ with one row of beans interplanted.

The best return per acre was obtained from treatments (*b*) and (*c*).

Trials of Long versus Short Rains Planting of Cotton.—This experiment was commenced in October, 1936. The harvest from the long rains plots planted in April, 1937, is not yet complete.

Cotton Stainer Counts.—The monthly average counts of cotton stainers, which were taken every seventh day at the Kirieni plot in the Meru District are given below:—

Month	*Average count on cotton.*
January	163.5
February	195.75
March	636.25
April	668.25
May	300.25
June	106
July	65.5
August	1770
September	7180
October	75.5
November	736.75
December	93.75

It appears from these counts that September is the month of the heaviest infestation. Stainers are found on the following indigenous trees and shrubs in the Fort Hall District:—

Abutilon Zanzibaricum, Ehretia sylvatica, Croton macrostachys, Triumfetta macrophylla, Bersama Abysinnica and *Bridelia micrantha.* The largest number were found on shrubs of the family *Malvaceae.*

Control of Stainers by Poultry.—Cotton was grown in two plots, 40′ × 15′, one of which was fenced. Poultry were run in the fenced plot. The experiment was started in August with the undermentioned result:—

Month	Strainer Counts With Poultry	Strainer Counts Without Poultry
August	27	328
September	13	191
October	20	117
November	16	216
December	10	190
Average ..	17	207

By the month of November the poultry had commenced to destroy the cotton plants.

Coffee

Variety Trials at Meru.—Variety trials were laid down with Blue Mountain, Kents Ceylon, Kents Tanganyika, Harar and Amfillo varieties.

Single versus Multiple Stem Experiments.—The trial is being conducted at Kaga Mission, Meru, and consists of alternate rows of single and multiple stemmed bushes. The bushes came into bearing in July for the first time.

Yields (dried buni).

Single: 98 lb.; Multiple: 140 lb.

Rice Variety Trials (Meru)

Of the numerous varieties tried, Dacca No. 2 and D.C. Palil are outstanding and worthy of continued trial. Colusa, Colora and Faya were received from Nyanza and planted in November.

Tobacco Trial (Kitui)

Two varieties of light leafed tobacco, Cash and White Stemmed Orinoco, were planted out at Kitui in November. The crop is promising.

Soya Bean Trials

Trials of twenty-three varieties of soya beans were commenced at Kiambu and Nyeri.

As a result of trials carried out at Fort Hall it appears that better results are obtained from "long rains" rather than "short rains" plantings. The variety Otoon is an upright grower and has given yields of over 1,000 lb. of seed per acre. Busa is a low growing variety producing stems over six feet in length and is therefore to be recommended as a green manure or short term cover crop. The yield of seed, however, is low. Bacterial inoculation is necessary in all parts of the Province in order to obtain nodule formation.

Beans Planting Date Trial

The initial trial has shown that mid-April plantings have produced by far the best returns.

Cereals

Ear to row selections were carried out with Awned Bulrush millet and Muratha maize.

Potatoes: "Internal Brown Fleck" Disease

An experiment was laid down to discover the effect of dressings of wood ash on the incidence of "Internal Brown Fleck". The dressings of wood ash were at the rate of 500 lb. per acre. 27 per cent of the potatoes were diseased on the plots receiving a dressing, while 34 per cent of the potatoes were diseased on the control plots. The disease was severe on all infected land this year.

Bacterial Blight of Beans

Selection work is in progress to evolve a type of plant resistant to blight. Fair success has been achieved.

Manurial Experiment

The design is a randomized block, replicated four times. Dressings of 2, 4 and 6 tons of farmyard manure have been applied annually for three years. The best economic returns have been obtained each year from 2-ton dressings. A separate experiment to discover the residual effects of 2, 4 and 6 ton dressings of farmyard manure was laid down this year.

Miscellaneous Crops

In addition to crop trials mentioned, numerous imported crops are under trial on all seed farms. Among the latter importations Pusa gram type No. 58 is most promising for the lower areas.

Nyanza Province

In this Province investigational work is concentrated to a certain extent at Bukura and at the seed farms, but, as in the Central Province, there is no proper experiment station.

Cotton

As a result of Mr. Milligan's recommendations a plan for cotton investigations was made and eighteen plots were started in the Province. The distribution of plots was as under:—

North Kavirondo	...	...	6 plots
Central Kavirondo	...	...	7 plots
South Kavirondo	...	...	5 plots

These plots were chosen to represent every type of condition, including the higher altitudes into which cotton growing may be extended. The trials conducted at these plots were:—

(*a*) time of planting, at eighteen plots;

(*b*) spacing, at six plots;

(*c*) variety trials (S.P. 20: N. 17) at seven plots;

(*d*) interplanting with catch crops, at four plots;

(*e*) raised beds versus flat land planting, at two plots;

(*f*) mulching for conservation of moisture, at two plots.

In Central Kavirondo, for the 1937 rainfall distribution and in the soil conditions of the plots used, early sowing (that is, sowing before the end of May) was more satisfactory than later sowing in the early season and middle season cotton

growing regions, but in the late season cotton growing region, very early (that is, before the middle of June) and very late (that is, after the end of July) sowings did not produce such good results as middle season sowings. It was observed that N. 17 grew more sturdily than S.P. 20 and that S.P. 20 matured a little earlier. Sown late S.P. 20 grew more sturdily than U/4/4/2 and matured about ten days earlier than U/4/4/2 at one plot in N. Ugenya. At the Asembo plot cotton sown on raised beds was neither at an advantage nor at a disadvantage in comparison with cotton sown on the flat.

In South Kavirondo S.P. 20 appeared to be early maturing, to form a compact growth and, at one plot, gave better yields than N. 17. Cotton sown in May and the first half of June gave the best results.

Rice

Variety trials and cultural method experiments.—A statistical variety trial was carried out near Kisumu with fourteen varieties which were made up of the eight best varieties of last year's trials and six introductions which were acclimatised at the end of 1936. The five best yielders, in order of merit, were:—

Ambarikori.
Maji Maji.
Sena.
Halkadui.
Lady Wright Cross-bred.

In North Kavirondo variety and planting method trials were conducted with the varieties which were isolated from the old mixture of varieties known as "Mumias" and grown throughout the rice-growing areas of North Kavirondo in the past. These varieties are:—

Bungala.
Sindano.
Mbuyu.

Methods of planting were (i) in lines; and (ii) broadcast. In all cases growth appeared to be sturdier in the line plots and there was a greater tendency for the crop to be laid in the broadcast plots. Mbuyu headed slightly earlier than the other varieties, but the final ripening of all varieties was fairly even.

Arabica Coffee Trials

These trials were laid down on the Kisii Seed Farm in 1936. They comprised five blocks of one acre each. The treatments were:—

(1) Variety.
(2) Soil control methods.
(3) Multiple or single stem pruning.
(4) Types of shade; permanent or temporary, and

the details are given under:—

BLOCK 1—
Variety .. Kents.
Treatment .. Multiple stem; *Sesbania* temporary shade; *Grevillea robusta* permanent shade; Napier grass mulch.

BLOCK 2—
Variety .. Kents.
Treatment .. Single stem; Napier grass mulch; *Sesbania* temporary shade; *Grevillea robusta* permanent shade.

BLOCK 3—
Variety .. Kents.
Treatment .. Multiple stem; *Tephrosia Vogelii* shelter lines between every 3 rows; *Sesbania* temporary shade; various permanent shade; narrow base ridges.

BLOCK 4—
Variety .. Kents.
Treatment .. Multiple stem; *Sesbania* temporary shade; various permanent shade; box terracing.

BLOCK 5—
Varieties .. Gethins, Amfillo, Blue Mountain, Harrar, Geisha, Kenya Selected Series "A".
Treatment .. Multiple stem; Napier grass mulch; *Tephrosia Vogelii* between each three lines; *Sesbania* temporary shade; *Grevillea robusta*, permanent shade.

In Blocks 2 and 4 small areas were left unshaded to note the effect, which was pronounced symptoms of "hot and cold" disease. It was found necessary to remove alternative rows of *Tephrosia Vogelii* in Block 3 during the year as the growth was so vigorous that the coffee was restricted. Generally speaking, this plot, although the coffee is more backward and has not yet started to bear a crop, contains the healthiest looking plants. The object of these trials is to determine the best and simplest method of coffee growing for natives.

Soil Fertility Experiments

An investigation in progress at Bukura is designed to test the effects on soil fertility of planting mixed crops in strips year after year, as against the effects of haphazard mixed planting for three years followed by bush or ley

(in customary native rotation) as against an improved food and cash crop rotation, both including a ley and without a ley. Thus, in effect, native planting and cropping methods are tested against a simple mixed farming cropping system and against other methods of planting which do not follow the native custom and the value of the inclusion of bush or ley is tested in each case. This experiment will last for at least another four years; at the present stage no statistical data of any significance are available.

The results of another soil fertility experiment at Bukura indicated that a grass ley treatment of two years' duration depressed soil fertility as measured by the yield of an indicator maize crop in the third year and that continuous cropping treatments showed no marked deleterious effect on soil fertility, in comparison with a Napier grass ley and green manure. These results are so much at variance with observed effect that it is felt that this investigation was disturbed by some unknown factor.

Interplanting Experiment

This experiment at Kakamega consists of a trial of methodical (in rows) mixed planting against random (broadcast) mixed planting and has been in progress since 1935. The following are the results since its inception:—

Crop	Total Yield	
	Methodical Plots	Random Plots
	Lb.	*Lb.*
Long Rains, 1935—		
Maize	544	358
Wimbi	183	185
Short Rains, 1935—		
Beans	200	270
Peas	51	50
Groundnuts	87	55
Long Rains, 1936—		
Mtama	91	174
Wimbi	208	179
Short Rains, 1936—		
Peas	77	74
Long Rains, 1937—		
Maize	644	623
Beans	229	265
Short Rains, 1937—		
Beans	31*	47*

*Note.—Owing to hail and continual heavy rain, this crop was a failure.

Groundnuts

A time of planting trial was conducted at Iwinda in North Kavirondo, plots being sown at approximately fortnightly intervals from the 16th March to 21st June. The results are given under.

Block "A"				Block "B"			
Plot	Plant	Harvest	Yield	Plot	Plant	Harvest	Yield
			Lb.				*Lb.*
1	16 Mar.	6 Aug.	50½	9	16 Mar.	6 Aug.	47
2	29 Mar.	12 Aug.	43	10	29 Mar.	14 Aug.	46
3	12 April	17 Aug.	63	11	12 April	18 Aug.	51½
4	26 April	2 Sept.	26½	12	26 April	7 Sept.	33½
5	10 May	10 Sept.	21	13	10 May	15 Sept.	42½
6	24 May	28 Sept.	19	14	24 May	29 Sept.	21
7	7 June	5 Oct.	14	15	7 June	5 Oct.	9
8	21 June	18 Oct.	18½	16	21 June	18 Oct.	16

The size of each sub-plot was 5 yards by 29 yards.

A similar trial, conducted at Marach, North Kavirondo, gave the following results:—

Plot	Planted	Harvested	Yield
			Lb.
1	1 April	10 August	30
2	15 April	24 August	22
3	30 April	2 September ..	24
4	1 May	4 September ..	14
5	15 May	7 September ..	11
6	31 May	Failed completely	—

(The size of each plot was 6 yards by 16 yards.)

The results of both trials show that there is a greater chance of obtaining a good crop if groundnuts are sown early in the season. Incidence of rosette disease was low on all plots, but there was a tendency for it to develop to a greater extent on the late sown plots.

Sweet Potato Variety Trial

Six varieties—Calabash leaf, Russian leaf, Linslade leaf, Early Butter, Yellow Jersey and Red Nancemond—were planted at Maseno in multiplication plots in September in order to obtain sufficient planting material to lay out a variety trial at a later date. The only observation to be made at this stage is that Red Nancemond grew more weakly than the others, but it should be noted that in earlier trials, in 1934, the varieties Early Butter and Calabash leaf were inferior to the large-leafed Uganda variety, both in sturdiness of growth, drought-resistance, yield and palatability of the tubers.

Cassava Varieties

Planting material of some varieties introduced from Amani, the mosaic resistance of which is unknown, were planted at Maseno in November, for multiplication. In 1938 they will be fully observed.

Cultural Method Experiments

Mulching.—A plot of Canadian Wonder beans was mulched with grass between rows and a plot of the same beans on similar soil was left unmulched. Growth of the mulched beans was the more vigorous, but the most noticeable result was that in a long dry spell the unmulched plants withered and the mulched plants remained green.

Finger Millet Variety Trial

A trial of the strain "Bukura" and of five local varieties of white finger millet was made on the Kisii Seed Farm, the object being to select for early maturity. The "Bukura" strain matured at least six weeks before any of the local white varieties. Heads were selected from the earliest maturing white varieties and the trial will be continued with those.

Miscellaneous trials.

Four Californian varieties of tomato were tried at Bukura. No results are yet available.

The tobacco variety "Iheme No. 3" from Tanganyika is a promising variety under trial in Nyanza. Seed selection is being carried out. An investigation into the best method of preparing tobacco seed beds was made. The methods were:—

(*a*) A seed bed was rolled and seed was then sown suspended in water from a watering can. Finally, pulverized and sifted soil was lightly sprinkled over the sown section.

(*b*) A seed bed was rolled and then lightly raked. Seed was sown as in (*a*) with the addition of sifted soil afterwards.

(*c*) A seed bed was left unrolled and the seed was sown on the even and pulverized loose surface.

The best method appeared to be (*a*), germination being more even than in the other two methods. Subsequently, growth was very much the same in the case of (*a*) and (*b*) and distinctly poorer in the case of (*c*).

Two hundred pounds of Kano sorghum seed mixed with kitchen wood fire ashes were kept in a seed bin for nine months and at the end of that time showed no signs of weevil attack.

Native Produce

Inspection and Marketing Services

During the year the main work undertaken by the Marketing Officer was—

(*a*) consolidating the inspection services, increasing their efficiency and revising the legislation for that purpose;

(*b*) generally supervising the enforcement of the Rules under the Marketing of Native Produce Ordinance and assisting in the organization of markets;

(*c*) conducting correspondence with the object of exploring overseas markets;

(*d*) investigating the local markets.

Inspection Services

Considerable progress was made with these services during the year and all areas in Kenya where native crop produce is grown in bulk are now served by inspection centres. A most noticeable improvement in native produce occurred during the year in the areas served in 1936 and this may be attributed largely to the fact that cultivators are now taking great pains to plant good seed, having learnt their lesson by the rejection of bad produce at the inspection centres. In most areas the produce now arrives at the centres clean and very little picking over is done, all this having been done at home; the native women, however, still make a pretence of picking their produce over whilst sitting down to exchange news with friends, and it is unlikely that this practice will die out quickly.

A pleasing feature to report with regard to these services is the increasing trust placed in them by merchants all over the country. District Agricultural Officers and the Marketing Officer are very quickly informed if any particular centre passes bad produce.

As funds become available the equipment of inspection centres is being improved, particularly by the provision of concrete sorting floors and shaker sieves. These latter have been evolved by experiments in design made by the Marketing Officer and District Agricultural Officers in the Central Province and a type has been made which is being used at centres all over the country.

Inspection tickets have been improved by the institution of an omnibus ticket which the transporter of produce obtains when moving produce from the place of inspection, thus obviating the necessity for him to carry a large number of small tickets.

Central Province.

Owing to the failure of the 1936 short rain crop there was not a great deal of produce moving until September when the long rains crop became available.

In this Province inspection is carried out by the examination of crops at centres situated at the exits from the districts. The produce is brought to these centres by traders who have generally purchased it at markets in the district. It is the duty of the native staff to visit these markets and point out what is good and what is bad produce. These educative visits are, however, rapidly becoming less necessary.

Great improvement was made in 1937 in the inspection services of the Embu and Kiambu districts, the standard of the produce leaving these areas reacting accordingly. In the more remote Meru District the produce is not up to the standard of the rest of the Province and a considerable amount of outside inspection work has had to be undertaken. By outside inspection is meant the inspection at markets in the district rather than at the inspection centres situated at the outlets.

The main problem during the year was that of wattle bark inspection. A big increase in the price of bark and extract took place at the beginning, and again in the middle, of the year. Agricultural Officers anticipated that there would be an increase in bark submitted for inspection and augmented the staff at inspection centres. The increase in supplies was, however, far greater than had been anticipated and in many

cases inspection centres were swamped. The unfortunate aspect of this increased cutting of bark was that numbers of immature plantations were stripped and the bark offered for sale. This cutting of immature trees was aggravated by the fact that, owing to the wet weather in the middle of the year, the price of charcoal went up to Sh. 5 per bag in Nairobi. Many Africans in Kiambu and Fort Hall districts cut their plantations and burnt the timber for charcoal, caring little if the bark which they stripped was mature or not, but taking it to the inspection centre to try to get it through. All this put a tremendous strain on the inspectors, large quantities of immature bark were burned, but also owing to the amount submitted quantities of bad bark passed the inspectors and were taken into the factories. The factory owners protested against the quality of the bark and said that the whole name of Kenya wattle bark and extract would suffer. The cutting of large numbers of immature plantations upset the wattle rotation in the districts, trees being cut in 1937 which should not have been cut until 1940. Yields were considerably less because of this and in many cases the plantations were cut so young that the seed was not viable and no regeneration occurred.

In order to prevent this havoc caused by price increase becoming universal, the situation was reviewed and the following steps taken:—

(*a*) The wattle inspection fee was increased from 30 cents per ton to Sh. 1/25 per ton;

(*b*) with this extra provision, the staff of inspectors was increased to enable any native desiring to cut a plantation to obtain advice on short notice as to whether it was ready for stripping.

This has now developed to such an extent that before cutting wattle plantations natives obtain a note from the nearest inspector or instructor to say that the bark is believed to be mature. This system has proved successful in greatly improving the quality of the bark offered for sale and has naturally decreased the quantity. This will help the industry greatly and ensure an adequate amount of good bark in years to come.

Nyanza Province.

In this Province the inspection system still rests on the individual load examination of produce at markets, to secure the educative effect to the individual cultivator. This system naturally needs a considerably larger number of centres than

the Central Province system. It is expected that in the near future it will be possible to give up load inspection and confine the work to the exits from the producing areas.

During the year under review the services were increased to include rice, the growing of which is expanding, and a first-class quality of rice has been turned out, particularly from Kusa in Central Kavirondo.

Groundnuts are now of such high quality that it is a matter for inquiry as to whether the standard achieved is not too high for the use to which the product is put. This is a matter which is being investigated. Simsim is also of such quality as to be outstanding when compared with other East African simsim.

With the posting of an Agricultural Officer to Kericho it was possible to inaugurate services in the South Lumbwa District and for squatter maize at Londiani, Kedowa and Lumbwa railway stations. The produce at these places has for a long time been much lower in standard than that of the rest of the Province; the institution of inspection should do much to improve this state of affairs.

The maize in North Kavirondo is of first class quality and is much superior to that grown by natives elsewhere in Kenya. During 1937 a great deal was sent down to the Central Province during the period of temporary local shortage in the middle months of the year following the failure of the short rains.

PRODUCE INSPECTED IN NYANZA

	Amount	Value
	Tons	£
Maize	24,600	91,000
Simsim	2,938	32,318
Groundnuts	3,755	28,478
Rice	511	2,861
Beans	822	4,849
	32,626	159,506

Rift Valley Province.

Nakuru District.—The inspection services in this area for squatter maize are more a charge on the time of the Marketing Officer than other parts of Kenya, as the Agricultural Officer, Njoro, who serves a large European area, cannot give the time to supervise the centres adequately.

Inspection was started as an experiment and as is usual in the case of experiments, it has been necessary to revise many previous ideas as to the best way to carry out the work.

The centres were kept open all the year but it was only during the early months of the year and during December that any considerable volume of maize was offered for inspection.

It is proposed in the future to open the centres each day for the earlier months of the year and when the main crop is over to open them only on certain days of the week. This will enable a considerable saving of money in wages to be effected.

Towards the end of the year Rules were introduced making compulsory the inspection of native grown potatoes before removing them from the district. These Rules were intended chiefly to stop bad potatoes leaving Elburgon. Fresh seed has been issued to the Forest Department's squatters in that area to enable them to grow potatoes of a good type.

40,260 bags of maize were inspected in 1937.

Coast Province.

Steps were taken during the year to improve the produce at the Coast under the first part of the Native Produce Improvement and Inspection Rules. Maize has been the chief crop dealt with.

The question of the proper inspection and grading of copra is being considered and it is likely that legislation will be introduced during 1938 for this purpose.

Other crops will also be dealt with in the near future, when it is hoped that marketing and produce inspection will be introduced together.

Marketing Services

These consist of services to implement the Marketing of Native Produce Ordinance as well as services given to areas where the Ordinance has not yet been introduced.

The former areas are:—

(1) Central Province.

(2) Rift Valley Province (Nakuru District).

(3) Coast Province.

The chief area under the latter category is the Nyanza Province.

The Central Province has the complete scheme working, as also has the Nakuru District in the Rift Valley Province but up to date the Coast Province has only had the Ordinance introduced in order to make use of the Weights and Measures Rules which have been promulgated under it.

In the Nyanza Province a considerable amount of work has been done on market organization and it is hoped to introduce the Marketing of Native Produce Ordinance during 1938. This could probably have been done in 1937 but for certain small local problems which it was thought desirable should be settled first.

A big step in marketing organization during the year was the introduction of the Marketing of Native Produce (Weights and Measures) Rules. These Rules make the use of the half-bushel measure and its smaller units compulsory for certain produce when purchased in amounts smaller than two hundred pounds. It can be said that no more popular piece of legislation has been introduced amongst natives. Agricultural Officers have been gazetted as deputy inspectors of weights and measures and in most cases the measures are tested and stamped by them before issue.

Central Province.

The main work in 1937 was in consolidating the work done in 1936 and, in the light of experience gained, putting right matters which had not at first run smoothly.

The actual introduction of the Marketing of Native Produce Ordinance in 1936 was not done until, with the will of the people and the assent of the trading community its provisions had been put into practice at a number of centres without legislative sanction. Some districts went further ahead than others; Fort Hall and South Nyeri in particular. Kiambu District lagged and this was chiefly due to the fact that the natives of the district are very progressive and had started buying produce at their own stores all over the reserve before the Marketing of Native Produce Ordinance was introduced; consequently when it was desired to establish the buying of produce at centres it was found that many stone built stores existed at unsuitable sites, whilst owners were naturally not keen on abandoning these to go to proper market centres. The clearing up of this position is naturally one that takes time, but great progress was made and by the end of the year all buyers of produce were established at buying centres. At the commencement of the year Embu District was not altogether satisfactory. A great deal of work

was, however, put in during the first three months of the year and the position was soon changed; the district is now as good as any other in the Province.

The market needs of the producer vary greatly from district to district, depending largely on the amount and type of produce grown and of the educational standard of the natives growing it. In Kiambu District for instance the very broken nature of the terrain and the fact that the inhabitants, particularly the women, have been educated up to a higher standard than other districts, makes it necessary to have markets at much closer intervals to meet the objection of the producer to carrying his produce long distances. In the remote Meru District there are up to date no large numbers of markets such as exist in say Fort Hall and Kiambu, the inhabitants still relying on the trading centres which are filled with Indian traders.

The buildings owned by native traders at the markets throughout the Province were greatly improved during the year and the general tendency is for the occupant of a plot at a market centre to seek to build a better building than his neighbour.

The Marketing of Native Produce Ordinance is now working efficiently and smoothly in the Central Province and with the inspection service, has been the salvation of the native produce trade. The aim of the future should be for better market buildings.

A note of warning should, however, be sounded about the native trader. Before the introduction of organized marketing, these were numerous throughout the Kikuyu tribal reserves and their operations were by means of the legislation confined to the fixed market centres not excluding trading centres. As long as they are performing their correct function, that is buying produce in small quantities at markets in the reserves, bulking it and transporting it to rail-head or some large centre for sale, they are of use to the community. When, however, they start trading at these large centres and buy produce to sell to the European and Indian firms in the same centres they become additional and unnecessary middle men.

Rift Valley Province.

Nakuru District.—The marketing system in this district is quite different from that in the Central Province. In the latter Government is endeavouring to help the natives to

market the produce grown on their own land in their reserves. In Nakuru District the scheme is to help the native squatter to market his maize which he has grown on a European farm on which he is working. Here the organized marketing of the native squatter-grown maize has caused considerable controversy. It is said that—

(*a*) by the provision of good marketing facilities it has encouraged natives on European farms to grow more maize;

(*b*) during the marketing season it takes native labour away from farms; and

(*c*) it has also encouraged theft

On the other side, however, it may be said that—

(*a*) if maize is grown by natives it is the duty of Government to see that they grow good maize;

(*b*) as long as European settlers keep large numbers of squatters who grow maize it is the duty of Government to the community to see that they grow a type of maize that will not deteriorate the quality of the European maize in the area through crossing;

(*c*) the natives here as elsewhere should be given an opportunity of obtaining full market value;

(*d*) by the opening of market centres and confining buying and selling to daylight hours, Government has stopped the former road-side buying of maize which, taking place at night, encouraged theft from the European crops; now maize has to be marketed at certain centres and it should be easy for an owner of an adjacent farm, who suspects that his maize is being stolen, to keep an eye on these centres;

(*e*) the provision of a number of buyers at each market centre insures competition; The Kenya Farmers' Association (Co-operative), Ltd., are represented at most places and their presence has a stabilizing effect on prices.

The working of the Ordinance during this season varied in efficiency according to the location of the markets. On the western side of the district the natives have been used to taking their produce to the established trading centres, such as Elburgon, and no trouble has been experienced in getting all the produce sold at the proper places.

On the eastern side of the district there are no established trading centres in the maize areas and natives in the past have been used to selling their maize either to farms, local shops, or to Indian lorries touring the district. Last season permission was obtained from the Nakuru District Council to establish maize markets in the road reserves. These roadside markets were first established near shops but as this gave the shop-owner a virtual monopoly it was decided that market centres should be as equi-distant from these shops as possible and that buying should only take place at such centres. This has been found to be a satisfactory arrangement.

This market scheme is admittedly an experiment and must be subjected to changes from time to time. There is no doubt, however, that it is performing a most useful service.

Coast Province

This Province will not for some time be of great importance from a marketing of produce point of view. It has, however, certain big problems the chief of which is the difficulty of seeing that the native is paid cash for his produce. It is proposed to introduce the Marketing of Native Produce Rules in 1938 and these together with Marketing of Native Produce (Weights and Measures) Rules and the establishment of proper market centres for crops such as copra, rice and maize should go a long way towards ensuring that the old advances system is broken.

There are precedents in the Coast Province for organization of marketing, since cotton markets have been established there (as elsewhere in the Colony) since the industry began and the legislation for the control of the cashew nut industry has led to organized marketing for this crop. In respect of the latter, this has proved most popular with the natives, with the facilities provided for ready sale for cash, and the planting of the cashew nut tree is increasing rapidly.

Nyanza Province.

This Province grows more native produce than any other Province in Kenya. Production is in the main confined to the three Kavirondo districts, and it is in these that market organization has developed. The original dealers in native produce in Nyanza were Indians and until recently they predominated in all districts. During the last two years, however, native traders have made their appearance particularly in North Kavirondo. In this district they became a distinct

problem and a menace to fair trade in that they picketed the trading centres making the women who were on their way to market sell their produce to them at low prices; they then took this produce into the trading centre and sold it to the Indians. This has been dealt with by the legislation providing for inspection before sale within three miles of an inspection centre and native traders are no longer able to buy produce at large. It will, however, need the Marketing of Native Produce Rules to put this matter on a proper basis, to take in areas outside the three-mile radius.

The native traders in North Kavirondo also tried to operate a co-operative society at Broderick Falls, against the advice of this Department, but this was a failure. (A further reference will be made to this later in this report.) Much work was done in North Kavirondo during the latter half of the year in closing market centres at unsuitable situations and transferring them to better sites; and in making completely new markets.

The native trader is not yet so numerous in Central Kavirondo, whilst in South Kavirondo he has only just appeared. In this latter district experiments were made towards the end of the year in the erection of buying centres for groundnuts at Kendu and for simsim at Sare. These buying centres will be watched with interest.

There is no doubt that the introduction of the Marketing of Native Produce Ordinance, to be accomplished in 1938, will be of great assistance to Nyanza Province in co-ordinating and completing the work that has been done up to date.

Native Council Market Services

This section deals with the help that the local native authorities have given their people, by the provision of facilities for the disposal of produce by the erection of godowns. This was begun before the organization of marketing under legislation, at the instance of this Department, to provide the competition of large buyers.

Central Province.

Godowns have been erected at the following centres in this Province and all are leased by the Kenya Farmers' Association:—

District	*Centre*
South Nyeri	Karatina, Kamakua
Embu	Sagana
Fort Hall	Fort Hall, Maragua, Thika
Kiambu	Thika, Limuru

The main produce which is being dealt with is maize, with potatoes at Karatina and Limuru. Approximately 20,000 bags of maize were purchased or about 12 per cent of the total crop. The Sagana godown was opened in January.

Nyanza Province.

The following godowns have been erected in Nyanza and all are leased to the Kenya Farmers' Association with the exception of the Broderick Falls godown:—

District	*Centre*
North Kavirondo	Broderick Falls, Butere Luanda
Central Kavirondo	Yala

The main crop dealt with is maize of which the Kenya Farmers' Association purchased 22,000 bags or 11 per cent of the crop. Simsim was also dealt with.

The Broderick Falls godown was leased by the Local Native Council to a native co-operative society which joined the Kenya Farmers' Association as an individual member. Despite the fact that these natives were given every assistance by the Kenya Farmers' Association in keeping books of account, etc., their affairs quickly became muddled and every evidence was given that without assistance the co-operative society was not competent to look after itself. In 1938 the godown will be run by the Kenya Farmers' Association.

Investigation of Overseas Markets for Export Crops

The problem of the best markets for Kenya native produce continued to take up a certain amount of time, samples of produce being sent all over the world.

Native Exports from Kenya

Potatoes

During 1937 native-grown potatoes were exported to the undermentioned places in the amounts stated:—

Destination	*Cwt.*
Aden	3,003
Bombay	22,915
Colombo	688
Calcutta	300
Dar es Salaam	8,264
Lindi	783
Mozambique	6,413
Mauritius	3,778
Majunga	364
Mikindani	91
Port Amelia	1,293
Tanga	658
Zanzibar	7,338
Total ..	57,898

After considerable amount of correspondence it has been established that Kenya's biggest market, Bombay, definitely prefers a white round potato, and seed issues will take place with a view to supplying that demand.

During times of shortage there is no doubt that pink-tinted potatoes will sell well but during times of glut they are difficult to dispose of at a good price, being only taken at cheap rates after the white varieties are finished.

Beans

The incidence of bacterial blight, anthracnose, and the presence of the bean beetle, coupled with two adverse seasons, have prevented the export of native grown beans from making the progress it was anticipated would be made. In fact there was a big drop in the exports in 1937.

Samples of white haricot beans were sent to Canada and England and encouraging reports have been received.

The difficulty will apparently be to keep the beans free from beetles and retaining a good colour. The heat treatment provided by the Department at the Coast, which is compulsory for all bean exports, kills the beetle but certain important markets do not like the evidence of weevil injury. The possibility of a polishing machine is being investigated.

The free export of beans from the long rains crop into the Union of South Africa was considerably interferred with towards the end of the year owing to veterinary restrictions enforced on importations into South Africa. The success of the representations which were made by the Department to the Minister of Agriculture for South Africa came too late in the season for export to re-commence.

Peas

Samples of Victoria peas were sent to Canada and from reports received there is little doubt that a good market should be available when there is sufficient quantity to export. This crop is now being increased rapidly.

Maize

No native maize was exported in 1937, as it was all needed for the internal market, in which it realized higher prices than export parity, on occasions of excessive premiums due to speculative competition by Indian buyers who feared there was to be a shortage in the Colony; this shortage did not materialize, but it became necessary for the Government to prohibit further exports of maize as over-export was threatened.

VALUE OF KENYA NATIVE EXPORTS, 1937

	Sh.		£
Cotton	3,830,360		191,518
Potatoes	330,066		16,503
Wattle Bark	909,667		45,483
Wattle Extract	1,515,116		50,500
Hides			
Sun-dried	1,734,228	3,921,401	196,070
Shade-dried	2,187,173		
Skins—			
Sheep Sun-dried	83,124		
Shade-dried	91,054		
Goat Sun-dried	732,503	2,127,789	106,389
Shade-dried	178,939		
Other	42,169		
Groundnuts	578,231		28,912
Oils,Sesame	323,961		16,198
	TOTAL		£ 651,573

SERVICES FOR UNSTAFFED DISTRICTS

There are still several native areas in Kenya in which there is no resident Agricultural Officer or Assistant Agricultural Officer. Occasional visits are paid to these areas by Agricultural Officers and other members of this Department's technical staff.

The undermentioned districts were visited in 1937 by the officers named:—

Nandi: The Senior Agricultural Officer, Kisumu.

Elgeyo, Marakwet and Suk: The Agricultural Officer, Kitale.

Kamasia: The Agricultural Officer, Njoro and the Agricultural Officer i/c Soil Conservation Services.

Masai: The Agricultural Officer i/c Grassland Improvement and the Marketing Officer.

Teita: The Agricultural Officer i/c Coast Province.

In Nandi District, the chief line of work was the encouragement of wattle planting. In Elgeyo, Marakwet, Teita and Suk, general agricultural problems were dealt with including the introduction of early maturing crops in dry areas, vegetable growing, compost making and small scale irrigation. In the Kamasia District, soil reclamation and reconditioning work was carried out, a survey being made. Good progress can be recorded.

In the Masai District, grazing control, grassland improvement and the marketing of hides and skins presented the main problems. In that area the Hides and Skins Rules, 1937, were introduced. Arrangements were made for the establishment of a fodder tree arboretum at Lemek in the Narok District.

GRADING AND INSPECTION SERVICES

The following report on the services for Plant Import Inspection, Grading and Conditioning and Cool Stores, has been prepared by Mr. C. L. Silvester, the Chief Grader and Inspector:—

Plant Import Inspection

The table following gives the number of packages and the declared value of the various importations into the Colony through Mombasa of seed, plants, fruit, etc., for the years 1935, 1936 and 1937:—

	No. of Packages			Declared Value		
	1935	1936	1937	1935	1936	1937
				Sh. cts.	*Sh. cts*	*Sh. cts.*
Seeds ..	2,111	796	783	41,710 71	34,762 47	39,704 56
Fruit ..	20,597	26,304	27,921	197,385 14	260,490 39	263,496 62
Plants ..	678	236	170	7,957 44	6,576 84	6,944 19
Fruit Trees ..	222	137	185	21,746 49	6,978 36	15,009 96
Tea Seed ..	554	309	229	91,684 00	12,173 88	21,988 59
Bulbs ..	192	200	199	5,096 94	32,665 00	11,736 53
Total ..	24,354	27,982	29,487	365,580 72	353,646 94	358,880 45

The number of packages shows an increase of 1,505 (5.38 per cent) when compared with the figures for the preceding year; there was also a slight increase in the declared total value. On behalf of Uganda and Tanganyika Territory, 131 packages valued at Sh. 4,923.01 and six packages valued at Sh. 73.50 were passed respectively.

Grading and Conditioning Services

Maize Grading

Maize from the 1936–37 season's crop had already commenced to arrive at the beginning of the year and grading was continuous from January to about the middle of May. No maize was graded from that time until the 23rd December, when deliveries commenced at Kitale.

(*a*) *Maize Submitted Direct for Grading at the Coast and Kitale.*—A total of 426,649 bags of maize was submitted for grading. The table following gives the grades, number of bags and relative percentage of the total received, with comparative percentages of grades for the previous year:—

Grade	Number of Bags	Percentage of Total Received	Comparative Percentage for 1936
		Per cent	*Per cent*
K2	165,966	38·9	47·19
K2 SW	64,715	15·16	12·06
K3	78,451	18·38	13·73
K3 SW	40,264	9·43	5·72
K8 FW	2,057	·48	1·48
K8 FW SW	2,729	·63	·97
Total Graded ..	354,182	83·01	81·24
Rejected:			
Wet	32,231	7·55	7·39
Musty	150	·03	1·34
Weevily	38,430	9·0	7·75
Other Causes	1,656	·38	2·27
Total Rejected ..	72,467	17·0	18·76
Total Received ..	426,649	100·00	100·00

The total received, viz. 426,648 bags is a decrease of 410,449 bags (49.04 per cent) as compared with the previous year's figures of 837,098 bags.

There has been a progressive decline in the standard and quality of maize submitted for grading during the last two years. This decline is attributed to the climatic conditions obtaining during certain months of the growing period of the crop resulting in increased incidence of ear rots and undeveloped grain.

The percentage graded K2 in 1935 was 76.03 per cent, whilst for the year under review the percentage has fallen to 38.9 per cent, the lowest ever recorded. Weevily maize has also shown a great increase during the last two years having risen from 1.33 per cent in 1935 to 9 per cent in 1937.

This decline in quality was foreshadowed in my annual reports for 1935 and 1936.

During the latter half of 1936, 58,700 bags of native grown maize were submitted for grading. High internal prices from September, 1936, onwards resulted in native

grown maize being consumed in the country. No native grown maize has been submitted for grading from September, 1936 up to the end of 1937.

Included in the foregoing table is 178,204 bags of maize graded at Kitale; particulars of this maize and the maize graded at the Coast appear in later tables.

The following table gives the sending station and the average moisture content of maize rejected as wet at the Coast and Kitale:—

Sending Station	Number of Bags	Average Moisture Content
		Per cent
Eldoret	1,087	15
Hoey's Bridge	3,775	14·7
Kampi ya Moto	2,881	14·6
Kitale	9,401	14·4
Kitale—Mile 33½	1,321	14·9
Lugari	461	14·9
Menengai	310	14
Njoro	729	14·8
Nakuru	1,155	14·4
Nyeri	300	14·8
Ol Punyata	2,748	15
Rongai	4,314	14·8
Turbo	1,111	15·2
Stations Unstated	295	14·4
Wet by Rain	2,343	—

West maize consigned direct to the Conditioning Plant is not included in the above table.

(*b*) *Maize Graded at the Conditioning Plant after Treatment*:—

Grade	Number of Bags	Percentage of Total	Comparative Percentage 1936
		Per cent	*Per cent*
K2	54,822	81·25	34·23
K3 ..	11,496	17·04	38·20
K3 C ..	305	·45	6·95
K8 FW ..	11	1·26	6·87
K8 FW C ..	838		8·6
Total Graded	67,472		98·54
Rejections..	..		1·46
Total Received..	67,472	100·00	100·00

The letter "C" following the grade indicates "treated by heat for the destruction of weevils".

The total graded at the Conditioning Plant is a decrease of 57.77 per cent compared with the previous year's figures.

(*c*) *Maize Re-graded.*—Only 2,930 bags of maize were re-graded and do not call for comment.

(*d*) The total number of bags graded, totals of (*a*) and (*b*) and re-graded noted in (*c*) was 497,051 bags, a decrease on the previous year's figures of 50.24 per cent.

Grading at Kitale

For the second successive season grading was carried out at Kitale. Deliveries of maize commenced on the 12th December, 1936. The figures given in the following table refer, however, to 1937 only and for comparative purposes maize submitted direct for grading at the Coast is also given:—

Grade	Kitale			Coast		
	Number of Bags	Percentage of Total Received		Number of Bags	Percentage of Total Received	
		1937	1936		1937	1936
K2	72,636	40·75	62·67	93,330	37·56	39·13
K2 SW	29,937	16·8	11·21	34,778	13·99	12·50
K3	28,749	16·14	13·68	49,702	20·05	13·76
K3 SW	16,374	9·18	4·68	23,890	9·61	6·25
K7	—	—	—	—	—	0·09
K8 FW	992	0·55	0·36	1,065	0·42	2·07
K8 FW SW ..	881	0·49	0·30	1,848	0·74	1·32
Total Graded ..	149,569	83·93	92·95	204,613	82·36	75·12
Rejected—						
Wet	9,265	5·19	3·38	22,966	9·24	9·49
Musty	83	0·04	0·05	67	0·03	2·02
Weevily	17,819	10·00	3·19	20,611	8·30	10·14
Other Causes ..	1,468	0·82	0·42	188	0·07	3·23
Total Rejected ..	28,635	16·07	7·05	43,832	17·64	24·88
Total Received ..	178,204	100·00	100·00	248,445	100·00	100·00

Shipments

Forty-eight export certificates covering 455,107 bags of maize were issued as shown in the table following:—

Number of Certificates	Number of Bags	Description
10	34,537	K2 (Second Grade.)
8	260,443	K2 (Second Grade) (shipped in bulk).
4	6,411	K2 SW Second Grade. Slightly weevily.
1	25,376	K2 SW Second Grade. Slightly weevily. (Shipped in bulk.)
1	23,717	K3 Third Grade.
6	85,482	K3 Third Grade (shipped in bulk).
3	5,394	K3 SW Third Grade. Slightly weevily.
1	13,164	K3 SW Third Grade. Slightly weevily. (Shipped in bulk.)
1	305	K3 C Third Grade. Treated by heat for the destruction of weevils.
1	278	K8 W Under-grade.

Inspection Certificates.—None were issued.

Local Shipments.—36,908 bags of maize were shipped to ports north of Beira, south of Port Said and the coast of Arabia, a percentage decrease of 33.84 per cent as compared with the total of 55,793 bags of maize for the preceding year.

Maize—General

It has already been stated that the climatic conditions which obtained in certain areas during the growing period were conducive to the development of ear rots, and weevil infestation was comparatively heavy for the same reason.

The prohibition of the export of maize except under licence, from 16th April to 12th October, reduced the total quantity of European maize exported. This action was taken because of a threatened shortage of native maize for local consumption, and that it was justified is indicated by the fact that no native maize was submitted for grading for export during the year.

Ear rots are very noticeable in early consignments of the 1937–38 season's crop.

Grading of Potatoes

57,922 cwt. of potatoes were submitted for grading and classified as under:—

Grade	*cwt.*
K1	199
K2	56,659
Seed	40
Rejected	1,024

The total submitted for grading, namely 57,922 cwt., is a decrease of 35.47 per cent of the previous year's total of 89,763 cwt. Excessive rainfall during the growth of the crop adversely affected both yield and keeping qualities.

Rejections were on account of decayed and sprouting tubers. Speaking generally, quality was below the standard of the preceding year's crop but was well up to the normal.

Very little damage due to potato moth or scab diseases was in evidence.

Ships' Stores.

Export entries for 5,259 bags of potatoes, estimated at 8,967 cwt. were passed, a slight increase over the 1936 figures.

Grading of Beans

The following table gives the varieties, quantities in bags and grades of beans submitted for grading:—

Variety	K2	K3	K4	Total Graded	Total Received
	Bags	*Bags*	*Bags*	*Bags*	*Bags*
Madagascar Butter Beans	1,868	—	—	1,868	1,868
Rose Coco	1,516	331	1,829	3,676	3,676
Canadian Wonder (Red)	552	—	—	552	552
Canadian Wonder (White)	124	—	—	124	124
Total ..	4,060	331	1,829	6,220	6,220

The quality of all beans graded was below normal. The free export of beans from the long rains crop into the Union of South Africa was considerably interfered with towards the end of the year owing to veterinary restrictions enforced on importations into South Africa. Representations were made by the Department to the Minister of Agriculture for South Africa and agreement reached. Unfortunately it was then too late in the season for export to re-commence.

Conditioning Plant, Kilindini

Maize

68,100 bags of maize were treated. Of this total 2,760 bags were consigned direct to the Plant.

Beans

4,327 bags of beans were treated for the destruction of bean beetle (*Bruchus* spp.).

Coffee in Parchment

A very interesting experiment was carried out on the drying of coffee in parchment. It had been considered by coffee experts that the type of machinery in use at the Conditioning Plant was unsuitable for the drying of coffee.

Eight consignments, consisting of 2,943 bags were treated. At the moment the final report has not been received from the owners of the coffee but it has been intimated verbally that the treatment was successful.

Should the opportunity arise, further experiments should be carried out as it is essential to know the following factors:—

(*a*) Rates of feed in proportion to moisture content of coffee.

(*b*) Effect of varying steam pressure at the rate of feed used.

(*c*) Maximum of excess moisture in coffee that can be extracted in one treatment.

General

Both boilers were re-tubed during the year and a new chimney erected on No. 1 Boiler. This work was carried out by the Engineering Department of the Kenya and Uganda Railways and Harbours.

A new milling separator was installed by our own staff.

Export of Potatoes

The table following gives the destination and quantity in hundredweights as declared in Customs Export Entries submitted for the years 1936 and 1937:—

Destination	1936 Quantity	1937 Quantity
	Cwt.	*Cwt.*
Aden	8,287	3,003
Bombay	43,796	22,915
Chisimaio	310	—
Colombo	1,278	688
Calcutta	300	300
Durban	526	—
Dar es Salaam	7,397	8,264
Lindi	669	783
Lourenco Marques	1,537	—
Mozambique	6,293	6,413
Mogadiscio	3,839	—
Mauritius	4,303	3,778
Majunga	419	364
Mikindani	69	91
Merka	398	—
Port Amelia	1,332	1,293
Tanga	345	658
Zanzibar	6,536	7,338
Total	88,878	57,898

Cool Stores

Comparative table of commodities stored during the last five years:—

Commodity	Unit	1933	1934	1935	1936	1937
Fruit	lb.	126,690	276,969	191,657	214,210	274,501
Fresh Fish	„	86,021	20,914	9,195	30,007	8,232
Cured Fish	„	41,407	40,839	48,427	50,416	44,598
Cheese	„	9,595	11,422	10,328	9,638	9,318
Offal	„	2,749	3,991	4,577	3,581	8,313
Poultry	Doz.	64	59	184	114	436
Butter	Cases	1,803	3,783	8,278	15,582	10,451
Beef	lb.	35,250	49,519	45,285	71,877	99,137
Mutton & Pork	„	18,692	31,273	39,997	36,678	53,109
Eggs	Doz.	6,720	3,225	7,925	11,310	11,280
Bacon and Ham	lb.	905	756	500	1,321	2,982
Vegetables	„	4,523	2,949	2,787	736	6,815
Yeast	„	1,924	645	212	544	523
Game	„	..	..	..	..	4,384

Note.—A small number of miscellaneous articles is stored each year which does not warrant inclusion in the foregoing table.

Beef, mutton and offal each show a considerable increase. Game is imported for the Ships' Stores trade. Drought in the early months of the year and an increase in cool storage space made available by the British India Line led to a reduction in the quantity of butter stored.

Financially the working of the Cool Stores proved very satisfactory.

On a number of occasions it was found necessary to refuse commodities (in particular imported fruit and local eggs) offered for storage, owing to lack of space.

Both machinery units were overhauled during the year.

ACKNOWLEDGEMENTS

In conclusion, Mr. Silvester expressed a wish to place on record his thanks, on behalf of the Section, for the kind co-operation and assistance of the following:—

Sir Godfrey Rhodes for allowing his staff to carry out the work of re-tubing the Conditioning Plant Boilers and to those officers concerned who carried out the work so efficiently.

The Port Manager and his staff for their continued co-operation and assistance.

PART III

FINANCIAL

Statements of Expenditure and Revenue for the fiscal year under review are given below:—

Expenditure	Amount Originally Sanctioned	Amount Expended
	£	£
"A" Administrative and General (including Total Cost of Headquarters Staff)	9,942	10,095
Grant to Royal Agricultural and Horticultural Society of Kenya	600	600
Contributions to Imperial Bureau of Entomology	300	300
Contributions to Amani Institute	2,143	1,820
Contributions to Imperial Bureau of Mycology	150	150
Grant to Imperial College of Tropical Agriculture, Trinidad	250	250
Contribution to Colonial Agricultural Service	140	140
Contribution to Imperial Agricultural Bureaux	525	562
Expenses of officers attending Courses of Instruction	—	139
Expenses of Board of Agriculture	450	430
Grant-in-Aid to Sisal Industry	1,000	1,000
Colonial Agricultural Scholarship Scheme	678	678
,, Veterinary ,, ,,	690	690
Contribution to Locust Research	408	408
Hollerith Cards for Agricultural Census	50	22
Expenses of visit of Irrigation Officer to India	480	—
Amani Institute	—	2,895
Purchase of Lorry	—	213
"B" Division of Plant Industry	10,348	10,614
Subdivisions—		
Scott Agricultural Laboratories	7,642	7,435
Coffee Team Services	5,789	5,388
Plant Breeding Services	2,366	2,359
Grading, Conditioning, etc.	5,785	5,422
Native Agriculture	22,156	22,113
£	72,492	73,723

Revenue	Estimates	Receipts
	£	£
Grading, Conditioning etc.	5,400	5,468
Sale of Farm Produce and Stock	(*a*) 900	(*b*) 245
Sale of Stores	50	168

(*a*) Including Veterinary Department revenue.

(*b*) Excluding Veterinary Department revenue.

PART IV

Summary of Legislative Changes Affecting Agricultural Industries in 1937

Coffee

The Coffee Industry (Amendment) Ordinance, 1937, provides for an increase in the representation of coffee planters on the Coffee Board, from six to eight, and for the withdrawal of trade representation on the Board. This was enacted at the request of bodies representing producing and trade interests. Provision is made for the transfer of a plantation licence and for registration of coffee millers.

An amendment to the Diseases of Plant Prevention (Coffee) Rules, 1935, allows of the consignment of trade samples of coffee from Mombasa to Nairobi subject to a permit being obtained from the Director of Agriculture.

The Native Grown Coffee (Amendment) Rules, 1937, specify the areas in which coffee may be grown and the varieties of coffee that may be grown in each area.

Cotton

Following on the Kenya Cotton (Amendment) Ordinance, 1936, which gave wider powers of control of the industry, new rules were promulgated during the year.

Cotton Tax.—A proclamation under the Cotton Tax Ordinance (Cap. 60) imposed a tax of two cents per lb. in respect of cotton ginned in 1937 in the Nyanza Province and in the districts of Mombasa, Digo and Kilifi. Later in the year this proclamation was revoked with effect from 12th November, in so far as it affected the districts of Mombasa, Digo and Kilifi.

Derris

The importation of seed of planting material of Derris was prohibited, except with the permission in writing of the Director of Agriculture. The object of this order is to prevent the importation into the Colony of strains of Derris that have a low rotenone content.

Grading of Export Crops (Agricultural Produce Export Ordinance, Cap. 98), Conditioning Charges, Cool Stores Charges

The Grading of Maize Rules, 1937, contain new descriptions of Grades K2–K6 in accordance with agreement reached between the London Corn Exchange, the Kenya Farmers' Association and the Department of Agriculture.

The Grading of Beans Rules, 1937, allow the export of under-grade beans.

With the exception of the points mentioned the new maize and beans rules contain only the original rules with the incorporation of amendments.

The reduced charge of 12 cents per bag applied temporarily during recent years by the Kenya and Uganda Railways and Harbours to cereals conveyed from the transit sheds to the conditioning plant and back, was introduced permanently; and the charge in respect of cereals consigned direct to the conditioning plant was reduced to two cents per bag, haulage being charged in one direction only. These reductions came into effect on 1st November.

The charges for the storage of eggs at the Government Cool Stores were amended to allow of the storage of eggs in cases containing more than 30 dozen at the rate of Sh. 1 for the first week and thereafter at the rate of 50 cents per week.

Inspection and Improvement of Native Produce (Crop Production and Live Stock Ordinance, 1926)

Consequent on the Attorney General's ruling, that the authority given to the Director of Agriculture, in the rules dealing with inspection of native produce, to specify areas to which the rules should apply and to fix fees for the inspection of produce, was *ultra vires* and should be vested in the Governor in Council, the old rules were revoked and new rules were enacted.

The following rules dealing with the inspection and improvement of native produce were gazetted during the year:—

The Hides and Skins Rules, 1937.

The Wattle Bark (Improvement and Inspection) Rules, 1937, and (Amendment) Rules, 1937.

The Native Produce (Improvement and Inspection) Rules, 1937.

The Potatoes Inspection (European Areas) Rules, 1937.

Marketing

The Marketing of Native Produce (Amendment) Ordinance, 1937, makes it clear that the provisions of the Principal Ordinance only apply to native produce purchased for resale or manufacture.

Under the Marketing of Native Produce Rules, 1937, no person may sell or purchase native produce except at a place declared to be a market under the Ordinance.

The Native Produce Marketing (Weights and Measures) Rules, 1937, lay down the weights or measures to be used by any person purchasing native produce.

An exclusive trading licence in respect of the production of tobacco leaf in the Sagana and Kitui areas was granted to the British American Tobacco Company for a period of seven years commencing on the 16th December, 1937.

Passion Fruit

The Passion Fruit Ordinance, 1937, which was introduced at the wish of the passion fruit growers, regulates the preparation for export and the marketing of the products of passion fruit grown in the Colony through an agency directed by a Board of Control. The Passion Fruit Rules, 1937, control the working of the agency and provide for the registration of growers.

The Passion Fruit Board appointed the Kenya Farmers' Association (Co-operative), Ltd., Nakuru, to be the agency with effect from June 11th, 1937.

Plant Protection

The Plant Protection Ordinance, 1937, was enacted as a result of the decision of the East African Governors' Conference held in 1935 that uniform legislation on the subject of plant protection be introduced in the East African territories. The provisions of this Ordinance are in effect identical with the repealed Ordinance and Rules thereunder except that certain powers previously possessed by the Director of Agriculture are now vested in the Governor and the Governor in Council. An Order under the Ordinance schedules the diseases and pests declared to be diseases and pests for the purpose of section 2 of the Ordinance and a further Order lays down conditions under which plants may be imported into the Colony.

The importation into the Colony of soil was prohibited on the 16th April.

Sugar

In accordance with the International agreement regarding the regulation of the production and marketing of sugar, the exportation of sugar (including jaggery) from the Colony to countries outside Uganda and Tanganyika was prohibited as from 1st September, except under licence from the Director of Agriculture.

Tea Cess

The Tea Cess Ordinance, 1937, provides for the imposition of a cess, at a rate not to exceed Sh. 1 per 100 lb., on all tea manufactured in the Colony, the proceeds of the cess to be devoted to the improvement of the tea industry of the Colony.

Under the Tea Cess Rules, 1937, tea manufacturers have to send a monthly return of their transactions during the previous month.

Weight of Bags

The Maize (Weight of Bags) Rules, 1937, prohibited the sale of maize, maize flour, maize meal or crushed maize in bags that have a gross weight of less than 203 lb., unless the gross weight or the weight of the contents is marked on the outside of the bag.

BROADCAST TALKS

A series of broadcast talks arranged by the Royal Agricultural and Horticultural Society of Kenya was given once a month through the courtesy of Messrs. Cable and Wireless, Ltd. These talks were also reported to the Press. They formed a useful way of keeping farmers up to date with the progress and results of the Department's work. The list of talks was as follows:—

6th May: Mr. G. J. L. Burton, Senior Plant Breeder and Experimentalist—"Plant Breeding."

17th June: Mr. H. Wilkinson, Entomologist—"Biological Control of Insect Pests."

15th July: Mr. T. L. McClelland, Plant Inspector—"The Multiple Stem System of Coffee Growing."

12th August: Messrs. R. J. Lathbury and R. S. Ball—Duologue between the staff of the Plant Breeding Station, Njoro.

9th September: Mr. V. A. Beckley, Senior Agricultural Chemist—"Organic Manures."

7th October: Mr. C. Maher, Agricultural Officer and A. N. Other—Duologue on Soil Erosion.

4th November: Mr. V. Liversage, Agricultural Economist —"Figures in Farming."

Nairobi Show

A comprehensive exhibit of the Department's current work and outlook was displayed at the Agricultural Show at Nairobi in June. The relief map done in conjunction with the Forest Department showed a section of country stretching down from Limuru to the plains. One half was afforested at the top or "Limuru" end, the land in the central "native reserve" part of this half was depicted as farmed in accordance with sound principles of maintenance of soil control and fertility, at the bottom or "coffee plantation" end sound agricultural practices were also depicted. The other half showing the same stretch of country similarly contoured was deforested at the top, the "native areas" were farmed according to the usual practices of the Kikuyu and the "coffee plantations" were also planted regardless of soil control. Rivers and streams with running water flowed through both halves—in the one the water was clear with a steady flow and in the other there was only an intermittent flow of dirty water carrying silt off eroded land. The bad half gave a faithful reproduction of the denuded lands which are a feature of this country to-day; the "good" half showed what should and still could be if all concerned adopted sound agricultural practices. The relief map was actually part of the Coffee Services' exhibit, which also included a living demonstration of how to avoid pollution of water from factory effluents and an exhibit of five transplanted coffee trees showing the successive annual stages of the multiple stem pruning cycle and a tree improperly pruned and suffering therefrom. An informative exhibit of the mealy-bug complex of mealy-bugs, predators and parasites was also shown.

Other exhibits included one showing the new work being done by the Chemical Section on sisal, that is on the reclamation of flume tow; the best kind of pyrethrum drying house was also exhibited, as well as a relief map demonstrating the necessity for and the method of preventing soil erosion on pyrethrum fields. A good and bad sample of compost was also shown so that farmers who either make it or buy it would not be ignorant of what proper compost should be like.

The views and activities of the Department on mixed farming problems were also displayed. A relief map of a good mixed farm was shown with terraces laid out and the run-off water guided into small dams to form water supplies for cattle. Plots of various grasses and fodder crops were on display as well as plots of rust-resistant and rust-susceptible

wheats. The susceptible wheats were suffering from a severe attack of stem rust whilst the resistant wheats adjoining were quite free. The results of the maize seed competitions were exhibited and explained and representative cobs of good and bad types were also shown as object lessons to farmers. On the stock side, a portable poultry unit used for folding poultry on the land was shown and sheep of good and bad mutton types were exhibited.

An ever higher standard of exhibits is necessary to attract the attention of farmers at Agricultural Shows and displays such as those described above cost quite an appreciable amount of money. It is time that special provision was made for agricultural shows rather than that considerable sums should continue to be taken from the votes which are earmarked for other purposes and can ill spare funds for agricultural shows.

Publications

East African Agricultural Journal

Vol. II, No. 4:

"Experimental Work with Crops and Pastures in the Rift Valley and Molo Areas of Kenya," by R. S. Ball.

"Sheep: A Study in Agricultural Evolution," by V. Liversage.

"Essential Oils, IV, Geranium Oil," by V. A. Beckley.

"Arabica Coffee and the Plant Breeder," by C. Maher.

"Pyrethrum Drying," by V. A. Beckley and F. McNaughtan.

Vol. II, No. 5:

"Some Aspects of the Poultry Industry in Kenya," by R. S. Ball.

"Compost and Composting I," by V. A. Beckley.

Vol. II, No. 6:

"Coffee Investigational Work," by A. D. Trench.

"Notes on the Forwarding of Specimens for Laboratory Examination."

"Compost and Composting II," by V. A. Beckley.

Vol. III, No. 1:

"Labour and Land in Native Reserves," by V. Liversage.

"Control of Primary Production," by V. Liversage.

Vol. III, No. 2:

"Farm Fencing I," by L. A. Elmer.

"Experimental work on Pastures in the Trans Nzoia District," by M. Halcrow.

"Mutton Sheep in Kenya," by R. S. Ball.

Vol. III, No. 3:

"Sprouted Grain as a Stock Food," by R. S. Ball.

"Farm Fencing II," by L. A. Elmer.

"Effect of Growth Substances on the Stimulation of Root Growth in Cuttings of *Coffea arabica*," by S. Gillett and T. H. Jackson.

MONTHLY BULLETIN OF THE COFFEE BOARD OF KENYA

Vol. III, No. 25:

"Importance of Establishing Strong Healthy Coffee Plants in the Initial Stages," by S. Gillett.

Vol. III, No. 26:

"Report on Coffee Berry Disease Investigations in 1936," by J. McDonald.

Vol. III, No. 27:

"Note on Manures and Manuring," by V. A. Beckley.

Vol. III, No. 29:

"Kepchomo Experiment Station," by G. J. L. Burton.

Vol. III, No. 31:

"Notes on Multiple Stem Coffee," by T. H. Jackson.

Vol. III, No. 32:

"Pollution of Water by Coffee Factory Effluents," by G. H. G. Jones.

Vol. III, No. 36:

"Report on Flour Beetles in Coffee," by H. Wilkinson.

In addition a number of short articles and notes have been published in the local Press.

STAFF LIST

AS AT 31ST DECEMBER, 1937

ADMINISTRATIVE AND GENERAL

Director—H. B. Waters, B.A. (Oxon).

Deputy Director—H. Wolfe, O.B.E., M.Sc. (Agric.).

Agricultural Economist—V. Liversage, B.Sc. (Lond.), M.S. (Wis.), N.D.A.

Accountant—A. Walker.

Clerks—R. Abram, R. F. G. Palmer, J. Riddell, Mrs. M. A. Carr Hole, S. G. Sharp, J. B. Gould, A. E. Dawes, S. Morrell, K. G. Ball, Miss H. M. Dewar, Mrs. A. L. Williamson, Miss B. R. Froome, G. L. Krauss.

Agricultural Officers and Experimentalists—A. G. Bailey, M.A., D. C. Edwards, B.Sc., A. C. Maher, M.A., Dip. Agric. (Cantab.), A.I.C.T.A.

Plant Inspectors—C. D. Knight, C. Fielding Fox.

Senior Agricultural Officers—W. L. Watt, Cert. H.A.S. Forestry, W. G. Leckie, B.Sc.

Agricultural Officers— C. O. Oates, N.D.A., N. Humphrey, N. D. Spranger, W. O. Sunman, B.Sc., Dip. Agric. (Wye), E. W. Gaddum, B.Sc., (Lond.), Dip. Agric. (Wye), A.I.C.T.A., M. H. Grieve, B.Sc., Dip. Agric. (Edin.), T. Y. Watson, B.Sc., Dip. Agric. (Cantab.), J. E. P. Booth, B.Sc., Dip. Agric. (Wye), A.I.C.T.A., R. E. T. Hobbs, Dip. Agric. (Reading), A.I.C.T.A., D. C. Chambers, B.A., Dip. Agric. (Cantab.), A.I.C.T.A., J. T. Moon, Dip., Agric. (Cantab.), A.I.C.T.A., M. Halcrow, B.Sc., Dip. Agric. (Cantab.), A.I.C.T.A.

Assistant Agricultural Officers.—E. L. Bradford, Dip. Agric. (Cedara), M. D. Graham, Dip. Agric. (Potch), L. C. Edwards, Dip. Hort. R.H.S. (Wisley), G. R. Nightingale, R. J. Benstead, N.D.A., L. A. Elmer, G. J. Gollop, A. W. Thomson, G. C. Javens, G. Beverley, G. Gamble, E. C. M. Green.

SCOTT AGRICULTURAL LABORATORIES

Entomologists—H. Wilkinson, A.R.C.S., F.R.E.S., F.L.S., R. H. Le Pelley, Ph.D., B.Sc. (Hons.), A.R.C.S., D.I.C., F.R.E.S.

Senior Agricultural Chemist—V. A. Beckley, M.C., B.A. (Hons.) (Cape), M.A. (Cantab.), A.I.C.

COFFEE TEAM SERVICES

Senior Plant Breeder and Experimentalist—G. J. L. Burton, M.C., B.A. (Cantab.).

Soil Chemist—G. H. G. Jones, M.Sc. (Wales).

Agricultural Officer and Experimentalist—S. Gillett, Dip. Agric. (Hons.) (Wye).

Plant Pathologist—C. A. Thorold, M.A. (Oxon), A.I.C.T.A.

Entomologist—A. R. Melville, B.Sc. (Edin.), A.I.C.T.A.

Plant Inspectors—T. L. McClelland, M.C., H. Naismith Jones, E. Cottington.

Assistant Agricultural Officer—A. Pratt.

Junior Laboratory Assistant—T. H. Jackson, Dip. Hort. (Reading).

Clerks—B. A. Pickering, L. O. Johnes, G. Finch.

Junior Laboratory Assistants—F. W. Evans, F. McNaughton, B.Sc. (Hons.) (Edin.), C. T. Dewar.

PLANT BREEDING SERVICES

Plant Breeder—R. J. Lathbury, M.A.

Agricultural Officer—R. S. Ball, M.A., Dip. Agric. (Cantab.), A.I.C.T.A.

Junior Laboratory Assistant—R. N. Noble.

GRADING AND INSPECTION (EXPORTS AND IMPORTS), GRAIN CONDITIONING AND COOL STORE SERVICES

Chief Grader and Inspector and Manager, Cool Stores—C. L. Silvester, N.D.A., N.D.D.

Grader and Inspector—P. V. M. Quiggin, B.A.

Assistant Grader and Inspector—M. E. Beverley.

Superintendent Maize Conditioning Plant and Cool Stores—D. F. Sargent.

Mechanic—A. E. Taylor.

Clerk—H. S. Cuthbert.

H. B. WATERS,
Director of Agriculture.

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